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The Farmer's Digest

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The Farmer's Digest

Volume 8 February, 1945 Number 9

Sods for Soil Improvement

Condensed from Pennsylvania Farmer

J. B. R. Dickey

IN TALKING to a farmer in southeastern Pennsylvania he brought up, with considerable concern, the prevalence during recent years of the practice of growing two crops per year on general farms; as for instance, peas or winter barley followed by a crop of corn or soy beans. His observations were that these farms were developing a serious erosion problem, where there had been little trouble before, and that the land, in spite of manure and liberal fertilization, seemed to be rapidly getting into bad shape. This sort of intensive cropping may be warranted as a war measure or in feed emergencies. If considered as such, and not carried on too long, it may not be serious, but farmers who have the future fertility of their soil at heart should realize its dangers on rolling Pennsylvania land and use it for emergencies only.

"It wonders me," as my Dutch friends say, how many farmers fully realize that plowing and working the land burns out the soil organic matter, a little the same as stirring up the furnace makes the coal burn up faster. The principal means of putting organic matter back into the soil is by means of sods. They build it up, not so much from the top growth plowed under as through the mass of fibrous roots with which a good sod fills the soil to plow depth and below. When such a sod is plowed the roots bind it together and also give it the good physical condition which makes it mellow and able to rapidly absorb and hold rainfall. Each succeeding year that a field is out of sod it washes more, soil condition becomes poorer and crop yields generally lower. In the normal Pennsylvania rotation the land is in sod (counting the seeding year in small grain stubble) half or more of the time. In the northern counties, where fields are in sod more of the

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time, and in corn and oats only two years, the organic matter content of the soil is higher, soil condition is generally better and washing less of a problem.

An interesting subject for a Grange debate might be: "Resolved that, in a livestock system of farming, the manure is a less important factor in maintaining fertility than are the sods needed to produce the required roughage." The manure helps tremendously, but in normal amounts it does not supply nearly so much organic matter as one good sod and we do not get it mixed with the soil so as to give us anything like the mellow condition which we get from the roots of a good sod. The main reason why most of the thousands of rolling to hilly farms in the Northeast are still producing as good crops as they ever did, after 100 to 200 years of operation, is no doubt because their owners were always mainly livestock men. To feed the stock they had to have hay and pasture. This meant sod crops; and the best way to grow the hay was in a rotation. The manure helped maintain fertility of course. It also helped to make the sods better and thicker. When lime and phosphate were needed the good farmer used them; mainly perhaps to grow more hay to keep more cattle; but the land at the same time benefited from the better clover sods and the additional manure. Most of our idle, abandoned farms are not the fault of the land or of erosion, but should be blamed on a system of farming which did not provide all of the above.

There are plenty of illustrations of what lack of sods in the rotation can lead to. Market gardeners who had no use for hay, and no land to spare for sod, soon began to wonder why their soil became so much harder, more cloddy and impervious, and why it washed so badly even on gentle slopes. Some potato growers with big ideas undertook to shortcut a real rotation by using sweet clover or soy beans. On soils previously well stocked with organic matter they got along for a while but soon ran into difficulties. Other potato men who followed a three-year rotation including a sod went on for years, even without livestock and manure. Farms operated by canning companies, where beans followed peas year after year, soon got into all sorts of trouble with their soil, in spite of the fact that both crops were legumes.

A poultryman wants all the grain he can grow but has no use for hay. Give him a tractor and let him farm corn and small grains and in a few years he will often have gullies his tractor cannot cross and a farm on the road to ruin. The trouble in some parts of the Far West with erosion and

dust storms was not so much because farmers plowed up the sods for wheat, during the period of war and high wheat prices, as because they did not get the land back into sod again when they were through with it. Much of the disastrous erosion in the South has been due to the lack of sods in the usual rotation of cotton and corn.

The writer has had many arguments with farmers who wanted to have an alfalfa field to furnish their hay as long as it would last, while they ran the rest of the farm in a grain rotation without sod. They felt that sweet clover sown in the wheat and plowed down the next spring for corn would answer the purpose. It might help, but it did not work out for the potato men. With plenty of manure and a ryegrass cover crop in the corn they may get away with it for a while, but it is a very questionable system of farming, especially on land likely to wash. Sweet clover and ryegrass, plowed down immature after short periods of growth, do not seem to furnish the same lasting type of organic matter which we get from more mature sods. The place for alfalfa is in the regular rotation, preferably along with some grass to make better ground cover and a thicker, more fibrous root system.

The tractor makes it possible, and perhaps temporarily profitable, to do a lot of things which we could not do before; but when tempted to double crop a field one might well consider how long it has already been out of sod, whether it is not time to seed it down again and whether such things as peas and winter barley are not excellent crops in which to do it. Soy beans make an excellent emergency or supplementary hay crop. They fit well into a regular rotation, as between corn and wheat. Many farmers have learned, however, what too many crops of soy beans will do in the way of including erosion, and beans certainly will not take the place of sods in maintaining soil condition and fertility. If one leaves out sods, or has them at too long intervals, he is deserting a tried and well proved system of soil management and is apt to be heading for serious trouble.

Cattle Like "Suiter's Grass"

Condensed from Southern Agriculturist

William C. Johnstone
University of Kentucky

To round out Kentucky's type of farming, a grass has been needed that becomes established quickly and which grows well under adverse conditions and on a wide range of soil types. Furthermore, it must provide palatable pasture over a long period of time and grow well in combination with legumes and other grasses.

Kentucky farmers are watching with interest a grass which seems to fill all these requirements. It is Kentucky 31 fescue, so named because it was in 1931 that it first came to the attention of the agronomy department of the Kentucky Agricultural Experiment Station.

For several years Kentucky 31 fescue has been used on the several outlying experiment fields. In all cases, it made most satisfactory growth and proved exceptionally dependable. At the experiment field meetings last summer, farmers were probably more impressed with the luxurious growth of Kentucky 31 fescue than with any other thing. At the Robinson Experiment Sub-station in the Kentucky mountains, the grass has been in a pasture mixture for several years. There the cattle have relished it and it has persisted well in a grass and legume mixture.

The history of Kentucky 31 fescue is an interesting one, dating back to 50 years ago when William M. Suiter of Menifee County, Kentucky, bought a steep hillside farm near Frenchburg. Early in the first spring, he noticed a few clumps of grass, the only green herbage on the hillsides. His team relished the grass so Suiter saved it and that summer stripped the seed from the few plants. Each year he saved and sowed seed.

In a few years the whole hillside was protected by a nice sod of grass, and livestock grazed it throughout the year. Neighboring farmers became interested and the grass was soon known as "Suiter's grass." It is believed that the original seed of the fescue grass was brought from Virginia by early settlers.

Mr. Suiter still lives on the farm, now operated by his son,

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B. F. Suiter. I visited them in mid-February, just after zero weather, and saw cattle in good condition grazing on green grass, a rare sight in the mountains at that season. Except for some lespedeza hay cut from the same pasture field the previous summer, cattle had gone through the winter on it. There were no washes or gullies on the steep hill as the hillsides were covered with fescue grass. They were paying their way by providing year-round pastures for hogs and cattle.

Each summer the younger Suiter and his two boys harvest grass with an old-fashioned cradle and beat out several hundred pounds of seed. Seed has been shipped to practically every county in Kentucky and to several other states. Reports from Florida, Georgia and South Carolina indicate this new grass has a wide range of adaptability.

The limiting factor in the rapid spread of Kentucky 31 fescue is the small supply of seed. Production in Menifee County is increasing and seed plots are being started elsewhere in Kentucky.

Kentucky 31 fescue is a bunch grass with growth habits similar to orchard grass. It grows on rather poorly drained soils, yet it stands drought well. The seed are slightly larger than those of orchard grass and plants become established quickly when sowed under normal conditions. Twelve to 15 pounds of seed per acre is the usual rate of seeding. Some farmers, however, sow as little as four pounds per acre in rows for cultivation in order to increase seed production more rapidly.

When seeded in late summer, Kentucky 31 fescue makes a fair cover crop for the winter and provides considerable pasture and some seed during the following spring. The sod persists for many years and provides a good grass combination for lespedeza. The grass does not become a pest and is easily plowed and destroyed when desired.

Kentucky 31 fescue is not expected to replace other important grasses, such as Kentucky bluegrass and orchard grass. Instead, it will supplement such grasses, particularly in areas where the older grasses are difficult to establish or slow to start.

Soil Fertility, Food Source

Condensed from The Technology Review

William A. Albrecht

Food is fabricated soil fertility. National consciousness has recently taken notice of the great losses by erosion from the body of the surface soil. We have also begun to give more than passive attention to malnutrition on a national scale. Not yet, however, have we come to recognize soil fertility as the food-producing forces within the soil which reveal national and international patterns of weakness or strength.

What is soil fertility? In simplest words, it is some dozen chemical elements which are being slowly broken out of mineral and rock combinations in the earth's crust and hustled off to the sea. Enjoying a temporary rest stop en route, they are a part of the soil and serve their essential roles in nourishing all the different life forms. They are the soil's contribution — from among a large mass of nonessentials—which empowers the germinating seeds and the growing plants to use sunshine energy in the synthesis of atmospheric elements and of rainfall into the many crops for our support. The atmospheric and rainfall elements are carbon, hydrogen, oxygen, and nitrogen, so common everywhere.

Soil fertility constitutes the 5 per cent that is the plant ash. It is the handful of dust that makes up the corresponding percentage in the human body. Yet it is the controlling force that determines whether Nature in her fabricating activities shall construct merely the woody framework, with leaf surfaces catching sunshine and with root surfaces absorbing little more than water, or whether inside that woody shell there shall be synthesized the innumerable life-sustaining compounds.

Soil fertility determines whether plant foods of only fuel and fattening values, or plant foods capable of body service as complicated as growth and reproduction, shall be grown in a given area. Because the soil accounts for only a small percentage of our bodies, we are not generally aware of the fact that this 5 per cent can predetermine the fabrication of the other 95 per cent into something more than mere fuel.

Realization is now dawning that a global war is premised on a global struggle for soil fertility as

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food. Historic events in connection with the war have been too readily interpreted in terms of armies and politics and not as actions calculated to mobilize soil fertility. Gafsa, merely a city in North Africa, was rejuvenation for phosphorus-starved German soils. Nauru, a little island speck in the Pacific, is a similar nutritional savior to the Japanese. Hitler's move eastward was a hope looking to the Russian soil-fertility reserves. The hoverings of his *Graf Spee* around Montevideo and his underground workings in Argentina, much more than being maneuverings for political or naval advantage, were designs on that last of the world's rich store of less exploited soil fertility, to be had in the form of corn, wheat, and beef.

In view of our youthfulness as an extensive country, our different geographic areas have registered themselves mainly as differences in body comfort, whether hot or cold, wet or dry. Because of the free flow of foods and food constituents by means of cheap transportation, we have not been cognizant of the differences in quality as well as in kinds of foods produced in adjoining districts that differ in soil. We have not yet marked out our country into smaller patchwork districts with distinctive local colorings, as the Old World has in the opinion of visitors from the New World. Limitations in travel, difficulties in food delivery, and all the other restrictions now making us more local will soon emphasize differences and deficiencies according to the soils by which we live.

Geographic divisions give us an East and a West in the country as a whole, while a North and a South for the eastern half are commonly interpreted as separations according to differences in modes of livelihood, social customs, or political affiliations. Variations in rainfall and temperature are readily acknowledged. But that these make soils so different in nutritional quality as to control differences in vegetation, animals, and human beings is not so readily granted. That "we are as we eat," and that we eat according to the soil fertility, are truths that will not so generally and readily be accepted. Acceptances are seemingly to come not by deduction but rather through disaster.

Vegetation has been distinguished by names of crop species and by tonnage yields per acre. Plants have not been considered for their chemical composition and nutritive value according to the fertility in the soil producing them. This failure has left us in confusion about crops and has put plant varieties into competition with one another rather than in support of one another. Now that the subject of nutrition is on

almost every tongue, we are about ready for the report that vegetation as a deliverer of essential food products of its own synthesis is limited by the soil fertility.

Proteinaceousness and high mineral contents of distinct nutritive values are more common among crops from soils receiving comparatively low rainfall and in less leached areas, as, for example, in the midwestern part of the United States. Hard wheat—so called because of its high protein content, which makes it useful in the milling of the patent flour for light bread—is commonly ascribed to regions having lower annual rainfalls. Soft wheat is similarly ascribed to areas of more abundant rain. The high calcium content, the other liberal mineral reserves, and the pronounced activities of nitrogen within the less leached soil must be accepted as the reasons for this distinction, in view of the fact that experimental trials supplying these fertility items to the soil in regions of high rainfall can result in hard wheat where soft wheat is common.

The proteinaceous vegetation and the synthesis by it of many unknowns which, like proteins, help to remove hidden hungers and encourage fecundity of both man and animal are common in the prairie regions marked by the moderate rainfalls. It is fertility of the soil, rather than low precipitation, which gives the Midwest, or those areas bordering along approximately the 97th meridian, these distinctions: (1) selection of it as a feeding ground by the thundering herds of bison, which multiplied to untold numbers on the buffalo grass; (2) the wheat which, taken as a whole rather than as refined flour, is truly the staff of life; (3) areas where cattle, on unhampered range, nourished themselves so well that they reproduce regularly without being pampered; and (4) the more able-bodied selectees for military service of whom seven are chosen out of ten, in contrast to seven rejected out of ten in one of the southern states where the soils are more exhausted of their fertility.

Protein production, whether by plant, animal, or man, makes demands on the soil-given elements. Body growth among forms of higher life is a matter of soil fertility and not one of photosynthesis only. It calls for more than rainfall, fresh air, and sunshine.

Heavier rainfall and forest vegetation characterizes the eastern United States, where the soils have been leached of much fertility. Higher temperatures in the southern areas have made more severe the fertility-reducing effects of the rainfall. Consequently, vegetation there is not such

an effective synthesizer of proteins. Neither is it a significant provider of calcium, phosphorus, magnesium, or the other eight or more soil-given fetus-building nutrients. Annual production of vegetation per acre is large, particularly in contrast to the sparsity of that on the western prairies. The East's production is highly carbonaceous, however, as the forests, the cotton, and the sugar cane testify. The carbonaceous nature is contributed by air, water, and sunlight more than by the soil. Fuel and fattening values are more prominent than are aids to growth and reproduction.

Here is a basic principle that cannot be disregarded. It has signal value as we face nutritional problems on a national scale. It is, of course, true that soils under higher rainfalls and temperatures still supply some fertility for plant production. Potassium, however, dominates that limited supply, to give prominence to photosynthesis of carbonaceous products. The insufficient provision of calcium and of all the other requisite elements usually associated with calcium does not permit the synthesis, by internal performances in plants, of the proteins and many other compounds of equal nutritive value. The national problem is largely one of mobilizing the calcium and other fertility elements for the growing of protein and not wholly one of redistributing proteins under Federal controls. As the distribution pattern of soil fertility is etched on the map, it delineates the various areas of particular success or particular trouble in nutrition. It coincides also with the regions where the starving plants can be given relief by particular soil treatments.

The more concentrated populations in the United States are in the East and on the soils of lower fertility. To those people, Horace Greeley gave good advice when he said, "Go west, young man." It was well that they trekked to the semihumid Midwest, where the hard wheat grows on the chernozem soils and where both the breadbasket and the meat basket are well laden and carried by the same provider—the soil. It was the move which spelled our recent era of prosperity. In Europe the situation is similar but the direction of travel was reversed and the time period has been longer. Western Europe represents the concentrated populations on soils of lower fertility under heavier rainfall. Peoples there reached over into the pioneer United States for soil fertility, trading for it the goods "made in Germany." More recently the hard-wheat belt on the Russian chernozem soils has been the fertility goal for Hitler's *Drang nach Osten.* Soil fertility

is thus a cause of no small import in the world wars.

Life behaviors are more closely linked with soils as the basis of nutrition than is commonly recognized. The depletion of soil calcium through leaching and the almost universal deficiency of soil phosphorus affect animals directly, since their bones are the chief body depositors for these two elements. In the forest, the annual falling of leaves and their subsequent decay, to pass their nutrient elements through the cycle of growth and decay again, are almost a requisite for tree maintenance. Forest soils offer very little fertility and offer it very slowly. Is it any wonder then that dropped antlers and other skeletal forms are eaten by animals to keep calcium and phosphorus in their cycle? Pregnant squirrels gnaw bones in their nests. Deer will select in their browse those trees that have been given fertilizers in preference to those that have not been treated. Pine-tree seedlings along the highway, transplanted from fertilized nursery soils, are eaten by deer while the same species in the adjoining forests go untouched. Wild animals truly "know their medicines," which they take as plants from particular levels of soil fertility.

The distribution of wild animals during pioneer days, the present pattern of domestic animal distribution, and that of concentrations of animal diseases can be visualized as superimpositions on the soil-fertility pattern as it furnishes nutrition. We have been prone to believe that these patterns of animal behaviors conform wholly to climate. We have forgotten that the eastern forest areas gave the Pilgrims only limited game, among which a few turkeys were sufficient to establish for us a nation-wide tradition of Thanksgiving. It was on the fertile prairies existing in the Middle West, however, that bison were so numerous that only their pelts were commonly taken. The distribution of domestic animals today reveals a similar pattern, but it is characterized more by freedom from disease (more properly, freedom from malnutrition) and by greater regularity and fecundity in reproduction. It is on the lime-rich, unleached, semi-humid soils that animals reproduce well. There the concentrations of diseases are lower and some diseases are rare. There the beef cattle are multiplied and grown to be shipped to the humid soils where they are fattened. Similar shipments of cattle from one fertility level to another are common in Argentina.

In going from midwestern United States eastward to the less fertile soil, we find that animal troubles increase and become a serious handicap to meat and

milk production. The condition is no less serious as one goes south or southeast. The distribution patterns of milk fever, of acetonemia, and of other reproductive troubles that so greatly damage the domestic animal industry parallel the soil-fertility pattern. Troubles in the milk sheds of eastern and southern cities are more a challenge for the agronomists than for the veterinarians.

Experimental soil treatments have demonstrated the important roles that calcium and phosphorus can play in animal physiology and reproduction. Applied on adjoining plots of the same area, their effects on sheep were registered as differences in growth per unit of feed consumed and as differences in the quality of the wool. Rabbits also grew more rapidly and more efficiently on hay grown where limestone and superphosphate had both been used than where phosphate alone had been used.

The influence of soil fertilizers registers itself pronouncedly in the entire physiology of the animal, seemingly so far removed from the slight change in chemical condition in the soil. This fact was indicated, in the study mentioned, not only by differences in the weight and quality of the wool but in the bones and more pronouncedly in semen production and reproduction in general. Rabbit bones varied widely in breaking strength, density, thickness, hardness, and other qualities beside mass and volume. Male rabbits used for artificial insemination became sterile after a few weeks on lespedeza hay grown without soil treatment, while those eating hay from limed soil remained fertile. When the hays were interchanged during the second feeding period, a corresponding interchange of sterility and fertility took place between the groups of animals. This factor of fertility alone is an economic liability on less fertile soil but is a great economic asset on the soils which either are more fertile naturally or are made so by soil treatments.

Instincts for wise choice of food are still retained by animals in spite of our attempts, for example, to convert the dairy cow into a chemical engineering establishment wherein her ration is as simple as urea and phosphoric acid mixed with carbohydrates and proteins, however crude. That milk cannot as yet be reduced to the simplicity of chemical engineering is demonstrated by calves which have rickets despite ample sunshine and plenty of milk if they grow on certain types of soil having distinctly low fertility. Rickets as a malnutrition "disease" according to soil type need not be a new concept, at least as far as this trouble affects calves.

Notwithstanding our attempt to relegate the cow into the lower levels in the biotic pyramid, even down to that of plants and microbes that alone can live on chemical ions not requisite as compounds, she still clings to her instincts of selecting particular grasses in mixed herbages. Fortunately she strikes up a partnership with the microbes in her paunch, with the result that some seven essential vitamins are synthesized there for her. We tend to forget, however, that these paunch dwellers cannot be refused in their demands for soil fertility to enable them to meet this expectation. England's allegiance in wartime to the cow as a ruminant that can carry on these symbiotic vitamin syntheses, and England's reduction of pigs and poultry that as nonruminants cannot do so, are more effective in bringing the soils more directly into efficient service for national nutrition than we have been prone to believe.

The instincts shown by animals are compelling us to recognize soil differences: Not only do the dumb beasts select herbages according as they are relatively more carbonaceous or proteinaceous but they select offerings from the same kind of grain according to the different fertilizers with which the soil has been treated. The fact that animal troubles are engendered by the use of feeds in mixtures only should be weighed against the fact that hogs select different corn grains from separate feeder compartments with disregard of hybrids but with particular and consistent choice among grains produced by different soil treatments. Rats indicate the same discrimination by cutting into the bags of corn that were chosen by the hogs but leaving uncut the bags holding the corn the hogs refused. Surely the animal appetite that calls the soil fertility so correctly can be of service in guiding animal production by means of soil treatments.

Curt P. Richter of the Johns Hopkins Hospital has pointed to a physiological basis for such fine distinctions by rats. Deprived of insulin, for example, they ceased to take sugar. But dosed with insulin, they increased consumption of sugar in proportion to the insulin given. Fat was refused in the diet similarly in accordance with the incapacity of the body to digest it.

The soil takes on national significance when it prompts the Mayor of an eastern metropolis to visit the Gateway to the West to meet with farmers discussing their production problems. More experience in rationing should make the simple and homely subject of soils and their productive capacity household words among urban as well as rural peoples.

Patterns of the distribution of human beings and their diseases, which can be evaluated nationally on a statistical basis as readily as can crops of wheat or livestock, are not yet seen in terms of the soil fertility that determines one about as much as the other. Man's nomadic nature has made him too cosmopolitan to permit his physique, health, facial features, or mental attitudes to label him as of the particular soil that nourished him. His collection of foods from far-flung sources also handicaps ready correlation of his level of nutrition with the fertility of his soil. We have come to believe that food processing and refinement are denying us some essentials. We have not yet, however, come to appreciate the role that soil fertility plays in determining the nutritive quality of foods, and thereby our bodies and our minds. Quantity rather than hidden quality is still the measure.

Now that we are thinking about putting blanket plans over states, countries, and possibly the world as a whole, there is need to consider whether such regulations can blot out the economics, customs, and institutions which have established themselves as a counterbalance to the soil's fertility, if not, indeed, as a mirror image of the distribution pattern of soil fertility. Since any civilization is actually premised on its resources rather than on its institutions, changes in the institutions cannot usefully be made in disregard of so basic a resource as the soil.

Researchers in soil science, plant physiology, ecology, human nutrition, and other sciences have given but a few years of their efforts to human welfare. These contributions have looked to hastened consumption of material surpluses from unhindered production for limited territorial use. They are now to be applied to production, and a production that calls for use of nature's synthesizing forces for food production more than to simple non-food conversions. When our expanded chemical industry is permitted to turn from wartime to peacetime pursuits, it is to be hoped that a national consciousness of declining soil fertility can enlist our sciences and industry into rebuilding and conserving our soils as the surest guarantee of the future health and strength of the nation.

Care of Milking Machines

Condensed from Electricity on the Farm

Dr. George H. Hopson

CARE of and attention to the milking machine to keep it in perfect shape is most important to better milking. Low or high vacuum is a frequent cause of incomplete milking. The usual causes of low vacuum are a worn pump, clogged pipe line, worn or leaky stall cocks, or even a cracked pipe line. High vacuum is usually caused by a worn vacuum controller. Even though both conditions cause incomplete milking, they act differently in doing so. Low vacuum will not open up the meati of the teats sufficiently to allow a large stream of milk to flow, nor will it take what milk there is away with sufficient speed. High vacuum may cause enough congestion and irritation on the ends of the teats so that cows will not let down their milk. High vacuum used over an extended period of time will cause a chronic thickening of the end of the teat, resulting in what sometimes is called a spray teat or a partial obstruction of the teat opening. Frequent checking of the vacuum with a tested gauge is very important and should be done at least once a year.

The teat-cups are the only part of the milker that come in direct contact with the cow's udder and teats and should be given especial attention. The liners should be kept at the correct tension so that the cows are milked in the same way every day. Two sets of liners should always be used, rotating the sets every seven days. Two sets used in this manner will not only milk much better but should last longer than two sets, and perhaps three, used continuously.

Cows respond to the minutest change, such as a gradual change in the loss of elasticity in the liners. The change is so gradual that it may not be noticed by the operator until its effect is shown after a period of time. Unfortunately cows cannot be relieved or broken of their bad milking habits as quickly as a mechanical condition can be corrected. It is much more satisfactory to keep the equipment in good repair and save the time and energy of training the animals over again.

Milk of the highest quality can be produced with the milking machine. Nearly all certified and premium milks are produced in this manner.

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What Kind of Horses Do We Need?

Condensed from Farm and Ranch

Wayne Dinsmore

Secretary, Horse and Mule Association of America

FIGURING the average life of horses at 15 years, and mules at 18 years, we need at least 622,000 horse foals and 197,700 mule foals produced annually to maintain the present horse and mule population. In 1943, there were but 377,000 horse foals and only 101,000 mule foals produced, surviving to January 1, 1944, so that we had only 60 per cent as many horse foals and 51 per cent as many mule foals as were needed for replacement purposes in 1943.

Some studies made by the United States Department of Agriculture in 1943 disclose that the average size of farms using animal power only was 139 acres, while those using tractor and animal power averaged 522 acres. This is in line with general observations and is the trend today on many farms; to use tractors for the heavy work of plowing and disking and horses or mules to supplement them in field work and for a multitude of miscellaneous jobs about the farm.

In many areas, especially in the middle west and northeastern states, farmers are now paying from two to three times as much for hired help as they did prior to the war. This, with high prices for horse feeds—hay and grain—has led to increased use of available tractors and to a curtailment of work animals on such farms to one or two teams; or to less use of work animals, which are turned out on pasture except when needed. In either event, demand for horses or mules has lessened, and prices for work stock are so much lower than in 1937, that many farmers have been disinclined to have their mares bred. This means still less foals will be dropped in 1945, and this trend may continue into 1946.

Some people, especially those without practical farm experience, are of the opinion that all the men who are in the Army or Navy are going to be so thoroughly trained in the operation of internal combustion engines, so accustomed to the use of trucks, tanks, bulldozers and airplanes and so inculcated with the idea of getting things done in a hurry, that they will not want to use

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animal power on farms they may inherit, buy, rent or operate after the war is over. This may be their inclination, but after they get through figuring out the investment required to equip and operate a wholly mechanized farm, and the income that will be received at yields per acre and probably lower prices, caution is apt to prevail, and they will keep their investment in power and implements as low as is compatible with efficient operation.

This trend toward an increase in the number of farms which will have both tractor and animal power makes a change in size and type of horses likely. It has been noted that farmers who use tractors for plowing and disking generally prefer medium sized, active horses standing around 15.2 hands and weighing from 1,200 to 1,300 pounds. Such horses are big enough to do most of the miscellaneous farm jobs just as well as draft horses, cost less to buy, raise or keep, and can be used for driving and for some riding as well. The same kind of horses generally are preferred on the smaller farms which are operated wholly with animal power. So far as mules are concerned, the 15.2-hand mule weighing about 1,200 pounds is big enough for most farm jobs. The vast majority of mules are smaller.

The size of the mare determines the size of the foal at birth and is the principal controlling factor thereafter; hence the get of a 1,000-pound Arab stallion on a 1,600-pound grade draft mare will mature at about 1,300 pounds, but as the Arab sire is purer than the grade draft mare, the foal will resemble the sire more than the dam in head, neck, quality, set of feet and legs, and TEN—Feb.
activity. The result is a useful, active animal of about the size wanted by the majority of farmers today; hence there is a distinct trend, which undoubtedly will increase, to breed big grade mares to sires from recognized light breeds, such as the Arab, Thoroughbred, Standard Bred, Morgan or others.

Pure bred utility horses of medium weight and excellent activity, probably will be developed in time from the efforts being made to create some new breeds; but this will take 20 years or more and in the meantime most of the desired work stock will come from the cross of light sires on grade draft mares and draft sires on small mares.

Riding horses have been the reverse of work stock, increasing instead of decreasing. Our estimates, which are conservative, now indicate that there are at least 800,000 horses in use under saddle in the United States. The distribution is substantially as follows: on ranges, working un-

der saddle, 500,000 in the seventeen western states; on farms, east of a line drawn north and south through Kansas City, Missouri, 150,000 head; in strictly pleasure use in or near cities, villages and suburban towns, and on race tracks there are 150,000 head.

The cost of raising riding horses east of the Kansas City north-south line is considerably greater than in the western states, and it is not profitable for a farmer in the East to raise many riding horses. If he has a brood mare of good riding type, is fortunate enough to have a good sire of riding type nearby, and raises the foals under pasture conditions, outdoors the year round, with access to all the good hay young horses will eat, but no grain, he may raise a foal to three years of age cheaply enough to make a profit possible. From there on, if the owner has enough work under saddle for the young horse to make him well mannered and responsive, he may sell for enough to make a profit; but if the owner has to turn the horse over to a trainer at three, his chances of eventual profit are exceedingly remote. This is why I have repeatedly said, in addresses and articles, that there is no money in raising riding horses under farm conditions, and the few exceptions merely prove the rule.

In contrast, cattle ranches raise their young riding horses cheaply, have mares enough to justify ownership or lease of a good stallion which can often be turned out on pasture with the mares, thereby increasing colt crops. The foals are reared on pasture and hay only, are handled a little as foals, weanlings, yearlings and two-year-olds, to make them gentle and accustomed to men, halters and saddles. Then at three they are put into regular "work under saddle" where they are ridden for three or four hours every third or fourth day. Thus they are given only half as much work as mature horses and thereby earn their keep, while becoming thoroughly trained to work under the saddle. This system gives owners a better chance to raise good riding horses, which they need in their regular work with cattle, yet make a profit on the animals when sold at moderate prices.

There will be a steadily increasing market for such "ex-cowponies" as pleasure riding horses from now on, for they can be bought at prices within the reach of millions of people. The increasing tendency of city people to acquire nearby country homes, with a few acres of pasture, will increase the demand for such horses. Polo mounts and some hunters will likewise come largely from such ranch-raised horses.

Color is commanding some preference now as evidenced by prices paid. We have no comment thereon, except to say that we are interested primarily in getting more people to ride, and consider the color of the horses they ride to be none of our business; that is up to the individual. But he will not stay satisfied with color, unless the horse bearing such color has the essential riding qualities and gives the rider a pleasant ride.

The trend today, therefore, is toward the production of horses suited for the job they are to do, whether it be in harness or under the saddle. The man who raises that kind, but raises no more than he needs for his own use, selling the gentle, well broken older horses at five to eight years of age, will make money from horses that are by-products of his farm or ranch.

Keep on Feeding Calcium

Recent tests at the Ohio Agricultural Experiment Station revealed that chickens receiving an ample calcium supplement to their ration laid twice as many eggs as did other pens of birds getting none. Many eggs from birds denied calcium were unmarketable because of thin shells.

Free-choice feeding of oystershell, or other shell equally effective, or feeding high-calcium limestone grit provides the needed calcium. Dolomitic limestone (high in magnesia) is ill-suited to feeding layers, and cuts production greatly.

—*Successful Farming*

Raising Sheep on Poor Feed

Condensed from The Sheepman

Wallace Clark

MUCH has been written on good feeds and feeding practices by writers on sheep problems, and it is easy for the farmer to consult his state university and learn the proper way to raise excellent sheep. A trip to the fair and he sees fine specimens of animals in the pink of condition. If he returns to a fine farm of high fertility, he may duplicate the same thing; but we all cannot enjoy the pleasures of the best land.

Much of our land is hilly and must remain considerably wooded. Much of our land has been damaged by erosion, with the result that it just isn't possible to raise economically the feed required to produce choice animals and, at the same time, maintain a flock of similar animals the year around. Of course, the use of such land in larger units helps some, but the cost of production is high and as a result the farmer is driven to the position of eking out a living by producing only for his own needs, with very little surplus to sell. When he lives in an area of cheaper land with only a small amount of creek bottoms in which to produce his grain, and the rest of his land is hills and hollows, he cannot feed his precious little grain to his sheep in order to market them high and realize value received. In attempting to do so, he suffers a loss, and makes himself and his land poorer.

Some years ago I raised a number of breeds of sheep at the same time under conditions of poor feed supply and attempted to weed out the breeds that could not subsist under those conditions. I used land in southern Indiana. I realized that there is often a greater variation among individuals than among breeds and took this into consideration as much as possible. However, this problem did not interfere with my experiments, as I found none of the common breeds—and I used practically all of them as well as some comparatively uncommon breeds — adapted to my poor feed conditions. I found death losses very high, with sheep in poor condition, particularly at lambing time. This was a good indication that they were not able to get their food requirements

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from grass grown on poor land and from brush and foliage. I found it necessary to buy considerable grain to keep them in even poor condition, due no doubt to the low protein content of grass and hay grown on poor land. It was too much to expect of them to raise a lamb or two, a heavy crop of wool, and take care of themselves at the same time.

In search of a "tough" animal, I tried to locate a sheep that was successfully grown elsewhere in the world under similar conditions. The only one that was at all available that seemed to exist under fairly similar conditions was the Scotch Blackface, also called Scotch Highland. This is, strictly speaking, a mountain sheep. There is no registration society nor anyone interested in promoting the breed in this country. It is unquestionably far hardier than any of our common breeds of sheep. Its origin is unknown, and it does not show any indication of other sheep strains in the breed. It stands alone in the sheep world, without relatives. Some believe that these sheep introduced themselves into Scotland by swimming ashore from a Spanish ship sunk by Sir Francis Drake. At any rate, the Scotch called them "collies." This explains the origin of the name given the Collie dog. The singular spelling was "colly" for both the sheep and dog. There are very few of them in this country and those are in the hands of probably a half-dozen breeders.

As to the characteristics of the "colly," it is rather slow-growing for the first year when purebred. The wool is long, ranging from six to 12 inches in length under ordinary conditions. The clip is light when bred pure, averaging not more than five pounds, and is classed as carpet wool. It is coarse and looks much like goat hair. The carcass is by nature not fat and in fact feeding grain seems to have little effect on the fatness of the sheep or lamb. They are an active mountain sheep, enjoy rough forage, and are not satisfied with being penned up and fed on refined food. They are small but well able to take care of themselves under almost any conditions. I do not know how they would handle themselves with dogs when in a large flock, but when alone or with lambs they will go after the dog. If not panicky, they would make it hard for the dog, as both ewes and rams are horned. The rams are not docked in Scotland and most breeders leave the tails on here, with no adverse results, as they do not often become soiled.

I am now sure that this mountain breed can furnish the blood for a successful sheep industry on marginal land because they stay alive under adverse conditions. This is most important, as it is

easy to figure the theoretical possibilties in raising sheep and to calculate the gross income, but the stumbling block is the net income after the death losses and depreciation are deducted. If fine sheep of our common breeds are selected and taken from good farms to marginal land farms, they do well for a short time perhaps, but the flock is really on the down grade—a fact that is apparent in a few short months. When the flock is culled, the sheep sold out show a loss compared with their original cost on account of a drop in quality. Successive losses when culling plus death losses and depreciation on account of the aging of the flock in general eat up what small profit there would be under any circumstances. The "collies" are different in that they change but little in appearance from poor to good condition.

You may now wonder what their utility is with so many apparent shortcomings in wool weight, finishing ability, and size. In England, we are told, they bring a premium for meat on account of their fine flavor. This I can readily believe, from having eaten "Highland lamb." As to the wool, the price last year through the pool brought 50 cents per pound. I have found the half-breds from fine wool sheep by Highland rams produce as much wool in weight as the ordinary native sheep and the selling price has been the same. Also these half-bred lambs were about like natives in rate of growth and final size, surpassing the purebreds. There is no doubt that Highland lamb, regardless of flavor, would be discriminated against in our present methods of livestock grading, and the raiser must be content to take a lower price, but it is produced at a lower cost. This would apply to the half-breeds. The purebreds would find a difficult market, as the buyers would ask where the little goats came from. I believe our only hope to help the marginal land sheep farmer rebuild his land and build an industry that would greatly augment our apparently dwindling meat supply is to furnish him Highland rams for use on native and fine wool flocks. If he saves ewe lambs, he will soon be able to replace his flock with half-bred ewes. These half-bred ewes seem to have the same stamina and efficiency in feeding as the purebreds and are larger and do have wool of a type now in demand. The purebred wool would be in better demand if our mills made tweeds and other coarse cloths as they do in the British Isles. There would be a demand for this half-bred breeding stock if its merits were known.

These half-breds should not be bred back to a Highland ram un-

less one is interested in pure Highlands because the next generation of three-quarters-breds cannot be told from purebreds, the Highland being such a strong breeder. The next question is what ram to use on these half-bred or even purebreds for market lambs. So far, I have only written of practical experience. I will have to resort to theory here, as I have not raised market lambs from any of them by cross breeding. I have been well-occupied in obtaining and producing the Highland blood and have merely assumed that by using a mutton-producing ram the lambs would be suitable for market. This would leave the ewe flock of the tough sort, the lamb would be fed by the ewe and marketed as usual off the grass at weaning time with little or no grain feeding of the lambs, as is done in Kentucky. Of course, the ram should be turned in late enough for the lambs and ewes to have the pasture season on soon after lambing. This leaves the raiser with only the ram to feed with grain prior to the breeding season if necessary.

In Scotland, we are told, a Border Leicester ram is used on the Highland flocks for market lambs. Upwey Farms of South Woodstock, Vt., report favorable results from Suffolk rams. The United States Experiment Station has been using Karakul rams with Highland ewes. I cannot really advise the raising of purebreds except to produce rams for cross-breeding purposes. Not knowing the relative advantage of the purebreds over the half-bred ewes for crossing with mutton rams, one could not advise their purchase for that purpose if available.

One Highland breeder has been exporting to Labrador which should be a good indication that in a tough country it takes a tough sheep. The Highland has the guard wool outside the inner wool, a characteristic of ancient breeds of sheep and not found on improved breeds. This is evidence that this sheep has not been susceptible to change. It would be difficult to modify the breed without changing it altogether. But we can toughen up our sheep for use on marginal land by introducing some Highland blood until such time as the meat and wool market learn to appreciate the qualities of the purebred "collies" in their "zoot suits."

Conditioning Bred Sows Sensibly

Condensed from American Hampshire Herdsman

Dick Hollstein

NOT ENOUGH emphasis can be placed upon the importance of correct feeding and handling of gilts before and during breeding season.

It is quite generally conceded that the time to start caring for a litter is before the sow is bred. It is my firm belief that if prospective brood sows are given the opportunity they so justly deserve, the results will be most gratifying, and much of the so-called bad luck at farrowing time will be eliminated.

Gilts should be in a healthy condition. Assuming they are healthy, they should be carried along on a well balanced ration; not fattening them as for market, on corn and heavy concentrates.

The feeds should furnish bulk, minerals, protein and as much fattening feeds such as corn, wheat or barley as necessary to produce a steady gain. Oats and ground alfalfa hay are the best bulky feeds and are ideal in regulating the fattening contents when self feeding is employed.

A few weeks before breeding time, the feed should be stepped up, or rather enriched. This can be done by adding any kind of milk, by increasing animal proteins in proportion to vegetable proteins, etc., rather than by too great an increase in corn. This practice is commonly known as flushing.

Regular blood testing for Bang's disease (contagious abortion) has become a regular "must" in the hogman's program of operation. It is to the breeder's own interest to know just how his herd stands in this respect and it is now generally demanded by prospective purchasers of bred sows. All herdsires, sows and gilts should be tested before breeding to prevent further spread if infection is discovered.

An ample supply of fresh water is very important and the chill should be taken out of it in cold weather. A large amount of water will be consumed by bred sows especially on the ration suggested.

Bred sows should have plenty of exercise. Various methods can be employed to bring this about. If self fed, the feeders and waterers can be located some distance

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from the sleeping quarters. If ear corn is fed by hand, it should be scattered out in the field or pasture.

Though it is not absolutely essential, it is much more satisfactory to sort the gilts into smaller groups. In so doing each group should be placed in a lot large enough to insure plenty of exercise. Sorting according to size and limiting the number eliminates piling up in sleeping quarters and overcrowding at the feeders. There is less danger of injury and the gilts seem to do better when in smaller groups of about the same size and age.

A problem that is looming large on the horizon of the purebred breeder and one that cannot be profitably ignored, is the high conditioning of bred sows to be sold into other herds, either privately or in sales. It has developed into a race to see who can present the highest fitted offering. For this the breeders cannot be blamed entirely, since the buying public has practically forced them to do so. Natural reaction of the breeder is that "If that is what they want, that's what we'll sell," even tho' it is against their better judgment. However, an increasing reaction against this high fitting by the buyers is becoming evident.

This, by no means, indicates that we must go to the opposite extreme. We want these sows to look their best and they do need enough conditioning and development to do a good job of suckling their litters. To get this job done to the best advantage from every angle, let me again present my pet formula, alfalfa hay. Feed a lot of it. Those who have not tried it, do not think it will bring about enough bloom and condition. I can assure anyone that it will. I have seen sale offerings of bred gilts fed in this manner that had as fine an appearance as anyone could ask for. But the most important fact is that they made good as brood sows by farrowing and raising good litters.

I prefer the self feeding of bred sows because I do not believe that anyone is wise enough to know just how much an animal needs and no two will require the same amount. Obviously the self feeding of bred sows requires a judicious apportioning of the various feeds used and this can only be estimated by the condition of the animals and the stage of conditioning to be attained. Assuming that the sows are in average condition, a good ration would be approximately 50% corn, 20% oats, 25% alfalfa hay and 3% to 5% animal protein supplement and mineral.

If this ration is bringing about a too high conditioning, the amount of hay can be increased and the corn or oats or both decreased. At no time would I

use a smaller amount of alfalfa hay and I would prefer more rather than less. I am still of the opinion that the value of this legume feed is far from being appreciated in the brood sow ration. Perhaps I should modify this statement by saying that few breeders realize how much of it can be utilized by bred sows though it has been in common use in small amounts for many years.

The most satisfactory way to feed this ration is to grind all the ingredients including the hay into one mixture and feed in self feeders. There are a number of grinders on the market and in use that can perform this in one operation, a great saving of time and labor. Since it is a general practice, particularly in the corn belt, to feed ear corn, the ingredients other than the corn can be mixed together and self fed and the corn hand fed if that is more preferable.

Terracing for Fun

Condensed from Soil Conservation

Glennon Loyd

Head, Regional Current Information Section, Soil Conservation Service, Milwaukee, Wis.

IMAGINE farmers having fun building terraces with a plow! That's precisely what they are doing in southwest Iowa, where they've made a contest out of what was a ponderous undertaking with heavy or special machinery 10 years ago.

Sponsored by the Mills County Soil Conservation District, the annual Midwest Plow Terrace Building Contest promises to assume its place in the field of rural sports along with corn-husking contests.

In three years, the event has gained a lot of prestige in that section of Iowa, where level terraces and good rotations form an ideal erosion control combination on gently sloping land.

In contrast with the handful of curious who turned out for the first match, 1,500 enthusiastic spectators watched Lynn Stephens, an entry of the Page Co. Soil Conservation District, win the 1944 event staged on Charles Kayton's farm near Hastings.

With his tractor and 2-bottom plow, Stephens, farmer and tractor operator at the Mount Arbor nurseries, Shenandoah, fashioned 300 feet of 94 percent perfect terrace in less than 2 hours.

Competition was keen among the 15 contestants. It included a farm wife, Mrs. Max Shook, one of the Mill County district representatives. And all of them threw up farmable terraces with plenty of water-holding capacity and broad bases on the 10 percent slope.

Judges William S. Speer, Merle Travis, and Faye McManigal reported that the terrace which won Stephens the $100 war bond had an effective height of 22½ inches and a channel cross-section of 19 square feet.

The judges' scorecard follows:

Water holding capacity	50 pts.
Tillability	20 pts.
Uniformity of slope	20 pts.
Efficiency of construction	10 pts.

A shotgun blast at 11 A.M. signaled the start of the event

Reprinted from Soil Conservation, Washington, D. C.

that had many of the trappings and much of the gala air of a cornhusking contest.

Spectators, predominantly farmers and their wives, spread over the 35-acre hillslope. As they do at husking matches, many of the watchers clustered around the lands of their favorites. Others moved constantly from one contestant to the next. A frequent remark was "That's simple. I could build one with my plow as easily as they can."

All of the 15 contestants, nominated by the commissioners of the 7 soil conservation districts in that territory, were farmers who had previously built terraces with their tractors and moldboard plows, the equipment they used in the derby.

The contest measured the skill of the entrants. But it did much more than that. As they sped back and forth in graceful arcs on their lands, the contestants showed much more dramatically than a mere demonstration that a farmer can build terraces with his own equipment.

The spectators' attention was called to the fact that the terracing system was designed and staked out by Mills County district technicians.

No two followed exactly the same pattern of construction, but they all got the job done. In general, however, they plowed as though they were back-furrowing. In successive waves they plowed and rolled the earth from the channel onto the ridge. They moved furrows uphill to form a gentle backslope.

To bridge the gap between the close of the contest and the announcement of the results, two disk tiller outfits plowed in a 6-foot gully and shaped it for seeding down as a grassed waterway.

Good Pasture Management

Condensed from Seed World

E. D. Walker

Extension Soil Conservationist, University of Illinois

EFFICIENT use and management of good pasture will do much to solve current war production problems of labor shortage, limited supplies of high protein feeds and feed grains, and soil erosion according to the Agronomy Department, College of Agriculture, University of Illinois.

With respect to labor, recent figures indicate that with dry lot feeding it takes 37 hours of man labor to provide all the roughage required by an animal unit for a year. If the animal can be kept on pasture six months out of the year, half of this labor of 18½ hours for each animal is saved. This saving really counts up on a good sized herd. How much it amounts to is indicated by figures assembled by the Dairy Husbandry Department, University of Illinois. An analysis of Dairy Herd Improvement Association records shows that it requires 11 hours of labor each day to care for the average herd during the winter and only 7 hours a day in summer when cows are on pasture.

Good pasture can replace sizable amounts of soybean meal or other high-protein feeds and feed grains. On the Experimental Farm at Urbana during the season of 1941 bromegrass-alfalfa mixture maintained protein content of more than 20 percent—nearly twice that of corn. Pasture forage such as this makes a high protein ration in itself. It is important, however, that legumes be included in the pasture mixture. On land at the Newton Experiment Field which had been treated with lime, phosphorus and potash, bromegrass with legumes yielded 3800 pounds an acre—two and one-half times as much as bromegrass alone—and the forage contained 60 pounds more protein per each ton. The production of high-quality forage also depends on the fertility of the soil. In another test Kentucky bluegrass grown on land liberally fertilized contained 365 pounds of protein per ton while on the adjoining untreated area a ton of forage contained 162 pounds of protein. With respect to substitution of pasture forage for grain and high-protein feed Animal Husbandry Department trials indicate that good green

Reprinted by permission from the Seed World, Chicago, Ill., Aug. 20, 1943

succulent grazing will save about one-fourth of the grain and one-half of the protein supplement ordinarily fed to pigs and will keep them clean and healthy. Similar savings are possible with other classes of livestock.

The abundant rains have served to emphasize that a great deal of sloping land is now being cultivated which would contribute much more to total war production if it were put in to pasture crops such as alfalfa, alfalfa-bromegrass, or other legume and grass mixtures, and these crops were then properly utilized by livestock. Under pasture cover this land could be useful for years to come whereas if cultivation is continued much of it will soon be ruined as far as crop production is concerned. Furthermore, much of the present acreage of permanent pasture could by proper soil treatment and renovation be made to carry at least *twice* the livestock it can now support and would suffer much less from erosion losses.

A pasture program which can help solve the problem already mentioned by supplying feed from early spring to late fall, should be built around a reasonable acreage of some dependable pasture crop. On many farms this will be permament bluegrass; if so, this permanent pasture in most cases should be improved by the use of limestone and legumes to make it produce a good yield of high-quality forage. On other farms the legumes or mixtures of legumes and grasses grown regularly in the rotation make up the major part of the pasture acreage. This also yields better when grown on soil containing plenty of limestone and phosphate.

With good permanent pasture or rotation legumes and grasses as the backbone of the system all that is needed is to fill in the gaps. For the period during March and April before the other pasture is ready, grains sown the fall before are very satisfactory. Rye is the standby, but during years of heavy spring growth winter wheat can be pastured during this period and winter barley can be used in southern Illinois. This small grain for early feed plus the permanent or rotation pasture will usually supply ample feed up to July 15. Second year sweetclover, if available, may be used to help out.

From the middle of July through August and September is, of course, a critical time when other pastures may be rather well dried up. For all sections of the state alfalfa is one of the best pasture crops for this period. If this isn't available, some sudan grass or sudan or soybeans mixed which may have been sown in late May after rye or winter barley was pastured out will supply

large amounts of palatable forage. In southern Illinois Korean lespedeza will make a good pasture for this time of year. Then as the fall advances and the rains come again stubble clover and fall growth of bluegrass and other pastures can be used to fill in. Rye seeded from August 15 on will supply late fall pasture and will make the earliest available forage the next spring. It is possible, therefore, with careful planning to have pasture from early spring to late fall.

Hogs, Artichokes and Power

Condensed from Rural Electrification News

THAT sounds like a weird combination of ingredients for successful farming — hogs, Jerusalem artichokes and power. But H. J. Stillings and his son cleared $8,000 in a year of feed shortages with use of that formula on their 120-acre farm near Hermiston, Oregon.

The story starts in depression days with the Stillings' search for a really low-cost hog feed. Although they had never heard of artichokes for livestock, they decided to try this root plant, which in Oregon is ready for harvesting about the first of November. Jerusalem artichokes have a heavy tuber and are planted with a potato planter the first year. From then on they develop by themselves. Also, they grow best in a light, sandy soil of the type on the Stillings' farm.

This is the way the Stillings go about hog raising: Their sows farrow in July and August and are turned out into clover. During the summer, pigs are on pasture and also get tankage and ground wheat. In the late fall they are turned out into the artichokes, where they root out the tubers and put on weight somewhat more slowly than on wheat, but at a satisfactory rate. The artichokes furnish feed until mid-April, with the help of alfalfa and a one-third grain ration. The Stillings estimate that artichokes save two-thirds of their hogs' ordinary grain needs.

By this system the hogs harvest most of their own feed, and are ready for market in the early spring. The Stillings estimate it takes about seven months to produce a 225-pound hog.

The Stillings grind their own grain. Once they dump a truckload of wheat, the grain doesn't have to be handled again until it's all ground and ready for feed. That fact alone saves them many

Reprinted from Rural Electrification News, Dec., 1944, St. Louis, Missouri

miles of driving and hours of labor. Wheat is dumped from the truck into a hopper and then elevated into an overhead bin by a one-horsepower motor driving a small, built-in elevator. From the bin it is fed into a hammermill powered by a 3-horsepower motor. After it is ground, it is blown into another overhead bin above the elevator driveway. When they want ground feed, the Stillings just pull a slide in a chute, and there it is. The entire operation is automatic.

One month the Stillings turned the hogs into a wheat field instead of harvesting the wheat, so they hardly used the hammermill at all. They figure they can grind feed for less than 15 cents a ton.

Studies on Nutritional Control of Milk Fever

Condensed from American Miller & Processor

W. E. Krauss

Ohio Experiment Station, Wooster, Ohio

DURING an attack of milk fever the calcium and phosphorus content of the blood are markedly reduced. The relationship between calcium and phosphorus metabolism and vitamin D suggested that the feeding of large quantities of vitamin D might be effective in preventing the drop in blood calcium and phosphorus at freshening sufficiently to avoid milk fever. Consequently, alternate cows in three herds at the Ohio Experiment Station and Ohio State University were fed 1,000,000 units of vitamin D daily for four weeks before and one week following freshening. The remaining cows served as controls and were fed similarly except for the vitamin D supplement.

Irradiated yeast, supplied by Standard Brands, Inc., was used as the source of vitamin D. During the first year and for several freshenings during the second year, 7F irradiated yeast was used. A switch was then made to 9F yeast. During the 7F yeast-feeding period 140 grams were fed daily to supply 1,000,000 units of vitamin D, while during the 9F yeast-feeding period only 110 grams were required daily to supply 1,000,000 units of vitamin D. Half the daily allowance of yeast was sprinkled over the grain at each feeding or fed separately.

Blood samples were drawn from the jugular vein four weeks before the theoretical due date, within 12 hours of freshening,

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within 12 hours after freshening, and one week following freshening. If a cow developed milk fever, a blood sample was obtained during the attack and daily for 7 days following treatment.

Serum calcium and phosphorus were determined on each sample of blood obtained. Later serum magnesium determinations were included. Larger samples of blood obtained at the same time were dried in an oven at 100° C. overnight and were fed later to rachitic rats to estimate vitamin D potency.

There was a slight lowering of both calcium and phosphorus just before freshening in both normal and milk fever cows. A further drop in these constituents occurred just after freshening, but was more marked in cows that developed milk fever. During milk fever, blood calcium dropped to about 40% of the normal level and phosphorus to about 30% of the normal level. The changes in the yeast-fed cows were slightly, but not significantly, less than in the controls. The concentration of calcium and phosphorus in Holsteins varied less than in Jerseys.

During milk fever a 75% increase in blood magnesium occurred. The significance of this is not clear. This may be a compensatory effort to counteract low blood calcium, resulting in anaesthesia rather than tetany.

The concentration of vitamin D in the blood of cows that developed milk fever was less than that in the blood of cows that calved normally. A drop in blood vitamin D concentration occurred at calving and was more pronounced during milk fever. However, milk fever occurred in some instances when the concentration of vitamin D in the blood was quite high.

On the basis of total freshenings no advantage resulted from the yeast-feeding program employed. This over-all picture is warped by the inclusion of small numbers of freshenings in the Holstein, Guernsey, and Ayrshire breeds. When Jersey freshenings alone are considered the incidence of milk fever in yeast-fed animals was slightly less than in the controls, while in Jersey "addicts" the incidence in the control freshenings exceeded that in the yeast freshenings by 26.7%.

It is apparent that the feeding of 1,000,000 units of vitamin D daily as irradiated yeast for four weeks before and one week following freshening offers no assurance that milk fever will not occur.

The calcium, phosphorus, and magnesium concentration of the blood are but little affected by the yeast-feeding procedure. Vitamin D concentration, on the other hand, is markedly increased. Since vitamin D concentra-

tion in the blood of milk fever cows was lower than in normal cows, since a drop in vitamin D concentration of the blood occurred in milk fever, since blood vitamin D was higher in Holsteins than in Jerseys, and since the results to date on Jerseys show the incidence of milk fever to be lower when irradiated yeast was fed, it is possible that vitamin D plays some role in regulating the mechanism that controls the sudden and marked changes in calcium, phosphorus, and magnesium that occur during an attack of milk fever.

Reed Canary Grass Helps in Gully Control

Condensed from Farm Science Reporter

H. B. Cheney, H. D. Hughes and Marshall Evans

We are in need of a grass that is suitable for gully control and for growing in waterways. Reed canary grass seems to be the answer.

Farmers who have given this grass a trial are coming to this conclusion. We believe that reed canary grass will be found of value on many Iowa farms, providing a means for controlling gullies with a minimum expenditure of labor. The grass fortunately has high value, too, for pasture and hay.

The control of gullies has become one of the most important problems on many Iowa farms because no method of control has seemed to be economically feasible. Hundreds of Iowa farmers have seen one field after another thrown out of cultivation because of gullies forming. Any heavy rain may start forming gullies on the average sloping farm.

In one county in western Iowa over 3,800 major active gullies have been reported. This does not include hundreds of small gullies recently formed which are rapidly becoming larger. The large acreage of row cultivated crops in Iowa, which has been increased in the war emergency, has contributed to the seriousness of the situation. The high intensity rains which have occurred over most of the state within the past few months have added to our difficulties.

Grassed waterways are a necessary part of any good soil conservation program. They are essential to the success of contouring, strip cropping and terracing. They provide a means for disposing of excess run-off from fields without gully formation. But the establishment of a good sod cover in these waterways is often a

Reprinted by permission from Farm Science Reporter, Oct., 1944, Ames, Iowa

difficult problem, and reed canary grass seems to be the answer.

You may ask: "Why is this grass better for erosion control than some of the grasses we have been growing for hay and pastures, such as bromegrass, timothy and Kentucky bluegrass? How are its habits of growth different?"

The vigorous growth of reed canary grass, its rapid root extension, the ease and rapidity with which a sod cover can be established from small root-stock portions and its ability to withstand silting and flooding make it a very valuable grass for gully control and for use in grassed waterways. This is not based on theory but on results obtained under practical conditions on Iowa farms.

Reed canary grass is a wet-land grass. It is native to Iowa. When growing wild it was always found in low, poorly drained areas. It will grow and thrive where water covers the surface through much of the year. On peat bogs and seemingly bottomless quagmires where animals bog down or do not dare to venture, the seeding of reed canary grass has resulted in a firm, strong sod over which horses and mowers and hay wagons pass with safety. Such is the strength of its sod.

But strange and almost unbelievable as it seems, we have found it to be one of our most drouth-resistant grasses when planted on upland soils. In the heat and drouth years of 1934 and 1936 it was the only grass that remained green through the entire summer on our experimental fields.

So vigorous is its growth that a small portion of underground rootstock placed at intervals of 2½ feet apart has resulted in a solidly sodded surface at the end of the second year. This may make you wonder, "If I plant reed canary grass, is it likely to become a weed pest—hard to kill out?" Our answer is "No." We have had many seedings of it under different soil conditions through a period of more than 20 years. We have always found that ordinary plowing and cultivation will completely eradicate it when this is what we want.

Reed canary grass makes an erect growth, often growing 4 to 6 feet high. The leaves are wide and seem to be rather coarse, causing one to wonder whether it has much value for pasture or hay. We have had it under observation as pasture for nearly 20 years, and records are available where it has continued under grazing for nearly 40 years. Grazing animals usually leave a stubble of 6 to 10 inches not consumed.

We have observed that horses eat the coarse appearing hay readily, preferring it to good timothy. The grass gives a large yield of

hay in two cuttings per season. The second cutting is usually fine and leafy.

The grass produces seed rather abundantly, but seed prices have remained rather high. This is because the seed shatter as soon as they have ripened. If the seed is fully ripe today do not plan to harvest it tomorrow for by that time the seed will be on the ground.

Reed canary grass is not recommended generally for use for hay and pasture on well drained soils because under these conditions other grasses, such as bromegrass, in combination with legumes, seem to be superior. After a few years, reed canary grass may become sod-bound and unproductive even when grown on a fertile soil. When grown in waterways and gullies, available nitrogen is added frequently in the runoff and this condition does not develop.

A small area seeded to reed canary grass—perhaps only 1/10 of an acre—will provide an abundance of root material for gully control and establishing grassed waterways on almost any farm. But on most farms this grass can well be seeded on a larger area where it not only will be available to furnish root material but also can be used for pasture or hay or to be harvested as a seed crop.

We suggest that the grass be seeded on a fertile area so located that it can be protected from grazing and still be accessible for pasture or hay crops. Often low lying land over which considerable water drains will be suitable. Plenty of rootstock material should be available for beginning the gully control program a year after seeding.

Spade or plow a few furrows of the reed canary grass sod, depending upon the number and extent of gullies to be controlled. Cut or plow the sod only about 3 to 4 inches deep. It is the rootstocks in the top few inches that are used. We suggest that you start with the smaller gullies first. For one of these half a gunnysack of sod pieces may be enough. A chunky sod piece is not needed, only two or three stems are enough. A corn knife is a handy tool for cutting up a supply of sod pieces.

Using a spade open up a slit in the soil in the bottom of the gully for a piece of sod. Firm this in the soil with your heel. Continue planting these sod pieces a few feet apart in the bottom and on the sides up and down the gully. Be sure to extend the planting well above any over-falls in the gully. An hour's work may be all that will be required to take care of some of the smaller gullies.

Gullies with over-falls of as much as 4 feet have been controlled in this manner. We are not sure just how successful reed ca-

nary may be in controlling larger gullies but we will be making trials during the next several years.

In many cases it may be desirable to shape the channel of the waterway before planting the reed canary grass rootstocks. This involves the plowing, disking or blading in of the gully to form a saucer or flat U-shape channel.

Plan for an adequate width to handle the drainage involved. A useful rule in fields with ordinary slopes is to allow a width of 2 feet for every acre drained; the waterway should be not less than a rod wide.

We are not certain just what will prove to be the best method of establishing stands in shaped and prepared waterways. We would suggest on a trial basis that the rootstocks be distributed with a manure spreader and then thoroughly disked into the soil. Plow the reed canary sod at a shallow depth—about 4 inches or less. Cut it up with a disk for easier handling, then load it into a manure spreader, for distributing in the waterway. Spreading manure at the same time is desirable. After disking in the manure and the rootstocks, firm the soil with a cultipacker or roller. The manure spreader has worked well in demonstrations on the Agronomy Farm at Ames.

Probably the best time to establish reed canary grass in gullies is in the late summer or early fall. Root portions put in place in moist soil in late August or early September will become well rooted before the ground freezes and be able to maintain themselves when heavy rains come in the spring. This grass has repeatedly been established at Ames from small pieces of sod placed in early September without a single failure. Establishment in gullies in the spring is also satisfactory except that the pressure of other work is usually great then.

This grass should preferably be seeded on moist, fertile soils. A good seedbed should be prepared as for alfalfa. Four to six pounds of seed per acre is the usual rate of seeding though in establishing small areas a somewhat larger amount of seed may well be used in order to hasten development of a good sod from which rootstocks can be obtained.

The seed may be broadcast or drilled. It should be covered about ¼ to ½ inch deep. One of the most desirable methods of seeding is to go over the field with a cultipacker or harrow before seeding; broadcast the seed; then follow the seeding operation with the cultipacker or harrow again, to cover the seed and firm the soil. An application of manure following seeding is always desirable with any grass.

Seedings are best made in the early spring though late summer

seedings also have been satisfactory. On poorly drained areas where it is difficult to get on early in the spring, the seedbed may be prepared in the fall and the seed sown just before the ground freezes. Seed will germinate and start very early the next spring.

This grass also can be seeded in grassed waterways in much the same way as any other grass. It has high value either for pasture or hay. Grass waterways should always be made wide enough so that they can be moved satisfactorily and will have sufficient capacity to carry water and handle any silt that flows into them. Cutting for hay is a good practice in the maintenace of any waterway.

Although seed is not produced during the first year, it may be harvested during succeeding years. Yields of seed of from 40 to 100 pounds per acre may be obtained. Because the seed shatters and falls to the ground almost as soon as it is ripe, the crop should be cut for seed as soon as the ends of the spikes begin to show the least amount of shattering.

Seed can be obtained through established seed channels, especially from the seed houses of the northern states. A few years ago seed sold at around $1.00 a pound. Approved methods of seed harvest have now been developed with the result that seed has generally been available at from 30 to 40 cents a pound, or in some cases even less.

Tenant-Purchase Program

Condensed from Missouri Ruralist

Cordell Tindall

AMERICANS love a success story. Here's one that is unfolding daily in every section of Missouri. Farmers participating in the tenant-purchase program of the Farm Security Administration of this state are 307.5 per cent ahead of schedule on their payments.

Due to rising prices and a guiding hand that has proved to be more and more practical, these men who once could not manage to scrape together enough of a down payment to buy their land are doing a great job of farming. And it's farming that pays off in profits.

The rules say you can't pay off in fewer than 5 years, but there are dozens of cases in which the new owner could make the last payment in that time if he so desired. Virtually all have whittled down their debt so they can take a period of lower prices, if they come, without danger.

In the state a total of $7,343,-

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120 has been provided for buying farms for men selected by the FSA. Of this amount $1,147,223 has been paid on the principal and $496,434 for interest.

This is despite the fact that the owners have 40 years to pay, with 3 per cent interest.

Yes, this is a part of the program of the Farm Security Administration, the unlucky federal agency that has received so much unfavorable publicity for its ill-fated ventures into communal farming, land buying, and labor housing. Today the emphasis is very definitely being put on the tenant-purchase program, a move applauded by most all farm leaders.

The TP program, as it is called, was designed to promote farm ownership and funds were provided by the Bankhead-Jones Act of Congress. In the beginning a limit of $12,000 was set as the top price that could be paid for a farm. Southern Congressmen later had this changed so the top price must be the average valuation of farms in the county. In other words, if the average value of farms, according to the 1940 census, is $3,500, that is the most that can be paid for a farm in that county. This price does not include the cost of any new buildings that must be built.

Under the present set-up of the Farm Security Administration the county committees, composed of 3 leading farmers of the county, play a big part in the management and policies. This is especially true in regard to selecting borrowers eligible for buying farms.

To be eligible to participate in the program you must lack adequate credit with any other agency or organization to finance the purchase of a farm. But this is far from being the only qualification. Character, past operations, general attitude, all are carefully studied by the county committee.

The farm itself must appear to be a sound investment. After locating a farm for sale the prospective borrower is aided by the FSA experts in determining the potential farm income earning capacity of the land. Average yields of crops are calculated and long-term price averages figured, so an estimate can be made of the possible income to be derived from crops. This is figured on a basis of the soil producing as it has in the past. Actually under good management crop production can be expected to go up.

Livestock carrying capacity also is estimated, as well as sources of income from other enterprises possible on the particular farm.

The object of this is to prevent borrowers from having too heavy a debt load that can't be paid off under normal conditions. This

keeps the prices of farms down.

After arriving at a figure of what the land is worth, buildings that will be needed are considered. The kind of farming operations planned influence this, of course. FSA engineers plan construction and what it will cost.

A unique feature of the tenant-purchase plan is the inclusion of money for soil-building practices in the original loan. If a soil needs liming the cost of limestone is added before approval is given the new borrower.

After all this preliminary work is done and the county committee finds the borrower meets with their approval, the loan is made, provided funds are available from county and state quotas.

Supervision by the FSA does not stop at the time of purchase. An accurate set of records is kept by the borrower. Expenses are divided into farm operating expenses and home expenses. Payments are based on the amount left after expenses have been deducted from total income. In some cases payments are set at so much a year, but ordinarily the payments depend entirely on income.

The farms are supervised by both the county supervisor and the home supervisor, much as the borrowers with "standard" loans are given aid. It is noted that the TP borrowers need less direct supervision and usually aid from the county office comes merely in suggestions for improving the farm.

To see the tenant-purchase program in operation we were taken into 2 typical counties by Jens L. Ingwersen, associate state director for the Farm Security Administration in charge of that particular part of their program. In South Missouri we visited Miller county; in North Missouri Linn county.

In Miller county top figure that now can be paid for a farm is $2,830. There are 18 TP loans at present. Of these, 9 are former standard loan borrowers, 4 of which had paid off the standard loans entirely.

This gives a good indication of the progress of farmers who were once rather hard up financially. There are records in Ed Smith's files that show men who had a total yearly income of several hundred dollars a few years ago now making several thousand dollars annually. Of course, war prices figure in this. Specific cases show one man making $1,041 in 1939 and $3,287 in 1943. Another made $1,434 in 1939 and $4,488 last year. One man who is on his third year almost doubled his income the second year of operating his farm, from $1,323 to $2,035.

Net worth figures have climbed even more. One borrower figured his net worth at $2,697 in 1939,

while last year he put the figure at $7,055. This man has paid $3,682 on his farm.

Out on the farms of the borrowers in that county it is difficult to place your finger on any one factor that has brought about such big increases in annual income. In general, it's all-around good farming practices.

On the farm of Clements G. Leuthen, Eldon, we were shown a well-constructed grass waterway ready to handle the water from terraces in various stages of construction. Good soil-conservation practices are making this land more productive. Fertilizer and lime made possible a highly profitable crop of red clover seed this year. Sweet clover has built the fertility of corn ground.

A neighbor, Lawrence W. Morgan, is emphasizing good livestock. A good purebred Hereford bull is adding to the value of his calf crop.

Still another neighbor, Aubra Johnston, is making a small farm highly profitable thru good dairy management. An important part of the FSA program is raising the family food supply with gardens. The Johnstons have 2 gardens and a well-filled food cellar. Home expenses are thus kept low.

Most lasting impression after visiting these Miller county farms is the pride in ownership. The Leuthens have a lovely bluegrass lawn, Mr. Morgan was putting finishing licks on a new roof, and Mr. and Mrs. Johnston have just completely done over the outside of their house, putting on new wall material and inclosing a porch. Yards and barn lots are neat and well tended.

As is to be expected in North Missouri, farms are of a more productive nature. For one thing, the top price in that county is $5,400. Before the limit went on some of the farms cost near the $10,000 mark.

There are 37 TP loans in Linn county now, last year 33 borrowers paid about $30,000. These men made on an average 2.85 payments. One man paid off $1,700 in one year.

Mr. Kerr notes that borrowers who got lime in their original loan have done the best job of making payments. On one farm a total of $520 was included for lime and phosphate.

Most of the farms in this county are about 160 acres, with several as small as 100 acres. This was considered to be at the lower limit for size, but the new owners have done well.

This then is the type of program that the Farm Security Administration is emphasizing today. Men of mature age, not too old, are getting a chance at farm ownership.

To Finish Young Steers with Grass and Grain

Condensed from The Southern Planter

E. A. Livesay
West Virginia University

EXPERIENCE has taught cattlemen that grass pasture alone will not produce sufficient finish on two-year-old steers to make the most desirable carcass and, hence, they generally sell at feeder price. Grain, fed in conjunction with grass, will convert such feeder steers into good slaughter cattle and save almost a full year in the age of steers normally marketed from grass alone. One of the chief obstacles to the beef cattle industry in the Eastern States, especially in grazing regions, is the slowness of the turnover. The industry can ill afford to continue to produce three-year-old steers and sell them as grass fat beef.

You will note that I have made a clear distinction between the beef cattle industry and an individual who may still buy two-year-old steers, keep them a full year and sell them as grass fat steers and find his operations profitable.

The West Virginia Agricultural Experiment Station has conducted several experiments in recent years dealing with various phases of utilizing grass along with some grain in finishing beef cattle. The main object being to secure a quicker turnover in the industry and to make the industry more profitable. In this article I shall give the main results of a three-year study of three methods of feeding grain in conjunction with grass in finishing two-year-old steers.

Thirty yearling Hereford steers were purchased locally each fall, for a period of three years. They were wintered as one lot each year in order to have all steers approximately equal in condition before dividing them into three lots at the beginning of the grazing season. For the first 56 days on pasture all lots received no grain. (This was not an arbitrary number of days, but was based on previous work which showed that the feeding of grain during the early part of the grazing period, or for a period of approximately two months, did not produce increased grains.)

The 30 yearling steers were wintered on a ration composed of 20 lbs. corn silage, 3 lbs. mixed

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hay, 3 lbs. oat straw, and 1.5 lbs. cottonseed meal, each of the three winters. When turned to grass each spring, they were divided into three lots of 10 head each, the lot divisions being made as uniform as possible.

All steers were pastured in the same boundary. At the end of 56 days on pasture, Lot 1 received grain (all grain hereafter mentioned consisted of 6 lbs. cracked corn and 1 lb. cottonsead meal) at the rate of 5 lbs. for the remainder of the main grazing season, or for a period of 84 days. Lot II received grain after being on pasture for a period of 84 days at the rate of 7.5 lbs., or for a period of 56 days during the main pasture season. Lot III received no grain during the main pasture season. In other words, during the best part of the pasture season (140 days, usually from the latter days of April until near the middle of September) the steers of Lot I and Lot II had received 420 lbs. of grain per steer and the steers of Lot III had received no grain.

For the 140 days of grazing, Lot I steers made an average gain for the three years of 275 lbs.; Lot II, 261 lbs.; and Lot III, 227 lbs. The 420 lbs. of grain fed Lots I and II produced an average gain of 48 and 34 lbs. per steer, respectively. The increase in weight was not large, however, and steers of these lots were judged to be fatter and tidier of middle than the steers of Lot III, receiving no grass.

At this point all three lots were annually fed a full grain ration for a period of 56 days, the steers of Lot I and II remaining on pasture and those of Lot III being removed from pasture to the dry lot. Eight lbs. of clover-timothy mixed hay was fed Lot III in the place of pasture for Lots I and II. During this 56 days feeding period the steers of Lots I and II were fed an average ration of 18.51 lbs. of grain, and Lot III, 20.55 lbs.

The average gains during the finishing period of 56 days were 126 lbs. for Lot I, 129 lbs. for Lot II, and 154 lbs. for Lot III.

In summing up, the increase in gains caused by the feeding of feeds other than pasture is as follows:

Lot I—1,455 lbs. of grain gave an average gain of 174 lbs. per steer.

Lot II—1,455 lbs. of grain gave an average gain of 163 lbs. per steer.

Lot III—1,151 lbs. of grain plus 448 lbs. of mixed hay gave an average gain of 154 lbs. per steer.

These added gains converted these two-year-old steers from feeder steers (in normal times) to very desirable slaughter steers. In fact, they dressed somewhat higher than the average

three-year-old grass fat steers from the better pastures of West Virginia. The average dressing percentages were around 60, and always slightly in favor of Lots I and II. Slaughter grades and carcass grades also ranked the finish of the steers of Lots I and II a little superior to those of Lot III.

These yearling steers averaged very close to 650 lbs. when started on winter feed in early December each fall and were marketed very close to an average weight of 1,150 lbs. in early November of the following year. In eleven months they made an average gain of 500 lbs. and were sufficiently well finished to dress around 60 per cent (hot market weight).

Each method of feeding grains proved satisfactory in utilizing grass during the grazing season and produced carcasses of a more desirable weight and slightly better finish than the carcasses of three-year-old grass finished cattle.

Any cattleman interested in feeding two-year-old cattle beyond a grass finish can study these methods of grain feeding and decide for himself as to his chances of profit. Variations in grain and cattle values from year to year, the margin between feeder and slaughter values, and the grade of cattle and other farm situations all must be considered. There is not enough difference in the results secured by the three methods to recommend one above the other. In seasons of drought, or when a pasture is overstocked, the methods used in the case of Lots I and II have an advantage over the short dry-lot feeding of Lot III. The cattle of Lot III could have been fed on pasture and thereby 448 lbs. of hay would have been saved.

I personally appreciate seeing big heavy steers leisurely grazing a good bluegrass, white clover sod, but when I stop to consider the cost of putting gain on such cattle I am thoroughly convinced that two-year-old steers are about as old as the industry can economically stand.

The day may not be far removed when a heavy proportion of eastern produced beef is coming from heavy fat calves weighing from 500 to 600 lbs. Creep feeding calves grain on pasture after they are two months of age will add better than 100 lbs. to our beef calves at weaning time and, unless market trends change, they will bring more dollars for slaughter than feeders can afford to pay.

The above statements are mentioned here for the sole purpose of getting beef producers to think of the most ecenomical method of producing 100 lbs. of beef.

New Varieties of Small Fruits

Condensed from American Fruit Grower

George M. Darrow

Bureau of Plant Industry, U. S. Department of Agriculture

DURING the 10 years from 1930 to 1939, inclusive, many new small-fruit varieties, introduced during or just before this decade, have been widely planted. Among these are the Blakemore, Catskill, Dorsett, Fairfax, and Redheart strawberries, which now make up over 40 per cent of the total crop of the United States; the Taylor and Washington red raspberries; the Stanley, June, Scammell, Weymouth, and Dixi blueberries; the Red Lake currant; and the Pixwell gooseberry. During the past 4 years the varieties of berries listed later in this article appeared in either nursery catalogs or research publications. This includes 31 strawberries, 5 highbush blueberries, 15 rabbiteye blueberries, 13 raspberries, 3 blackberries, and 2 currants, 69 in all.

During the next 10 years many of these varieties introduced during the past four years will undoubtedly be found well suited to the conditions in many regions. Indeed, some—notably the Klonmore and Massey strawberries—have already become popular in two areas. A continued accumulation of information regarding such new varieties is of importance, for some of these varieties may solve the problems of many growers. We are contributing suggestions from our experience: growers will soon accumulate much additional information. Some suggested new varieties of small fruits for specific regions are:

Southern States

Florida to Texas strawberry growers should try Klonmore, a variety that has already supplanted over half of the Klondike acreage in Louisiana and constitutes at least 7 per cent of the total acreage of strawberries in the United States.

South Carolina to Louisiana farmers should begin the testing of rabbiteye blueberries, such as Myers, Clara, Owens and others that are far superior to the unselected wild seedlings now commonly grown.

North Carolina

Because of its large size, high dessert quality, and bright color, the Massey strawberry already

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makes up over half the acreage in the Wallace area.

The Atlantic blueberry, though late, is so much larger than the older varieties, such as Rubel and Jersey, that it should be thoroughly tested.

Kentucky, Missouri

The Tennessee Beauty seems much superior in size, appearance, dessert quality, and freezing quality to the Aroma for a late shipping berry.

The Tennessee Shipper strawberry is exceptionally firm. Its season is just after Blakemore, and it is slightly smaller.

The Sunrise raspberry, though smaller than Latham, is about 2 weeks earlier and much more resistant to leaf spot and anthracnose.

New Jersey to Virginia

Where the red-stele root disease of strawberry has been serious, the variety Temple should be tried. Where it is not a factor, the Midland and Fairpeake strawberries seem well worth testing. The Maytime strawberry is already succeeding where a very early variety is to be grown. The Sparkle strawberry, though of medium size, is succeeding as a late variety. The Redstar strawberry has merit as the latest variety.

The Sunrise raspberry is succeeding as the earliest red variety.

Northern States and Canada

The Burgundy strawberry, though imperfect-flowered, is succeeding in Minnesota. The Midland, Sparkle and Redstar strawberries are worth testing from New England to Iowa. In southern New England, New York, and Michigan the Atlantic, Burlington and Pemberton blueberries should be tested. The Cascade currant is earlier than Red Lake and fully as large.

The Milton raspberry is a large, bright-red, mosaic-escaping variety well worth testing for a late sort. The Rideau raspberry is a hardy, second early sort, not so large as Milton or Taylor, but worth testing.

Pacific Coast Region

The Brightmore strawberry, the Willamette Raspberry, and the Pacific and Cascade blackberry varieties are all promising in the Northwest. The Merton Thornless blackberry should be tested in comparison with the Thornless Oregon Evergreen to see if it is larger, better in quality, or more widely suited.

Small-Fruit Varieties Introduced Since January, 1940

New Strawberry Varieties

Borden—From Dominion Experiment Station, Ottawa, Canada. Large, midseason.

Branford—Experiment Station, Mt. Carmel, Conn. Light bright

red; for preserving and quick-freezing.

*Brightmore — From United States Department of Agriculture and Oregon Experiment Station, Corvallis, Ore. Blakemore x Oregon 154 (Ettersburg 121 x Marshall). Very good for preserving and freezing, either whole or sliced. Early as, but smaller than Marshall. Suited to Oregon and Washington, but too weak a grower in Maryland.

*Burgundy—From Minnesota Fruit Breeding Farm, Excelsior, Minn. Easy picker x Duluth. Imperfect-flowered, hardy; fruit large, dark, glossy, flesh dark red. Season late. Too subject to leaf spot except in far North.

*Crimson Glow—New Jersey Experiment Station, New Brunswick, N. J. Fairfax x New Jersey 51 (Pearl x Aberdeen). Fruit firm, sweet.

*Fairpeake — From United States Department of Agriculture, Beltsville, Md. Chesapeake x Fairfax. Productive, fruit medium to large, bright medium red, dessert quality very high, sweet. Season late as Gandy. Only moderate plant producer.

*Julymorn—From New Jersey Experiment Station, New Brunswick, N. J. Redheart x New Jersey 5 (Mastodon x Howard 17). Fruit large, irregular, dark red, very firm dark red flesh, very late. Suited to quick-freezing. Often not vigorous, needs fertile soil, very productive.

*Klonmore — From Louisiana Experiment Station, Baton Rouge, La. Klondike x Blakemore. A Gulf Coast variety. Very resistant to leaf spot. Quick-growing plant in spring; fruit bright, smooth, fairly firm, early, replacing Klondike. Too small north of Gulf Coast.

*Konvoy — Louisiana Experiment station, Baton Rouge, La. Fairmore x Klondike. Very productive, size more uniform than Klondike, dark red, too soft for shipment, good for quick-freezing. A Gulf Coast variety.

*Majestic—From Virginia. A second early. Too disease-susceptible to become an important variety.

*Massey — From the United States Department of Agriculture and North Carolina Experiment Station, Raleigh, N. C. U.S.D.A. No. 634 (Royal Sovereign x Howard 17) x Blakemore. Large, glossy, bright-red firm, high dessert quality, suited to eastern North Carolina. Though flesh is firm skin is tender.

*Maytime — From the United States Department of Agriculture, Beltsville, Md. Missionary x Fairfax. Earliest, often a week before Howard 17 and Blakemore. Large, firm, glossy, medium red, good dessert quality. Blossoms so early that it may be caught by frost.

*Midland—From United States Department of Agriculture, Beltsville, Md. Howard 17 x Redheart. Very large, glossy, deep red, firm flesh, also deep red, dessert quality very good, season early, about the same as Howard 17. Should be tested from southern New England to Virginia, west of Iowa and Kansas.

*Northstar — From United States Department of Agriculture, Beltsville, Md. Howard 17 x Redheart. Makes too few runners, large, second early, high dessert quality, not very productive.

*Redstar—From United States Department of Agriculture, Beltsville, Md. Chesapeake x Fairfax. Showy, bright red, large, very firm, high dessert quality, latest commercial variety. Should be tested from Maryland to New England, west to Missouri and Minnesota. So late that it must have moist fertile soil and be well mulched.

*Redwing—From New Jersey Experiment Station, New Brunswick, N. J. New Jersey 46(Pearl x Aberdeen) x Fairfax. Large, attractive, bright red, firm, mild flavor, late.

*Sparkle—From New Jersey Experiment Station, New Brunswick, N. J. Fairfax x Aberdeen; only medium size, bright glossy red, firm, midseason, reported as having some resistance to red stele, though susceptible under some conditions.

*Starbright — From United States Department of Agriculture, Beltsville, Md. Chesapeake x Fairfax. Only moderate plant maker, firm, very attractive, bright red, high dessert quality, midseason, only moderately productive.

*Temple—From United States Department of Agriculture, Beltsville, Md., and Maryland Experiment Station, College Park, Md. Berry resembles a bright Dorsett, ripens just after Blakemore, red-stele resistant, suited to Eastern Shore of Delaware, Maryland and Virginia; not tested elsewhere.

*Tennessee Beauty—From West Tennessee Experiment Station, Jackson, Tenn. Missionary x Howard 17. Good shipping and quick-freezing berry, large, attractive, productive, somewhat drought-susceptible, midseason to late. Much superior to Aroma where comparative tests have been reported.

*Tennesse Shipper — From West Tennessee Experiment Station, Jackson, Tenn. Missionary x Blakemore. Firmest shipping berry, only medium size, tart, excellent for quick-freezing, second early. Should be compared with Blakemore in Kentucky, Tennessee, Missouri, and surrounding area.

Blueberry Varieties, Northern Type

*Atlantic—From U. S. Department of Agriculture, Beltsville, Md. Jersey x Pioneer, largest berry of all, good quality, light blue, late season. Proven productive in New Jersey. Should be tested in other sections.

*Burlington—From U. S. Department of Agriculture, Beltsville, Md. Selected by Miss E. White at Whitesbog, N. J. Rubel x Pioneer. Latest variety of northern type, week later than Rubel, good quality, medium size, light blue, best scar at picking. Proven productive in New Jersey. Should be tested in northern sections.

*Pemberton—From U. S. Department of Agriculture, Beltsville, Md. Katharine x Rubel, most vigorous bush in New Jersey, late, berry dark blue, tears when picked, very large berry. Proven very productive in New Jersey, and in limited tests even more promising in northern sections.

Blueberry Varieties, Southern Type

*Black Giant — From Crestview, Fla., very vigorous, large, black, rather soft berry, subject to fruit spot.

*Clara—From southern Georgia. Vigorous, medium size, medium blue color, high-flavored berry.

*Hagood — From Crestview, Fla., spreading bush, medium-sized black, rather soft berry, somewhat subject to fruit spot.

*Myers—From southern Georgia. Spreading bush, medium size, medium blue color, firm, good-flavored berry.

*Owens — From Crestview, Fla., bush very vigorous, large, black. May be best black variety.

*Ruby—From Crestview, Fla., bush medium vigor, berry large, firm, blue, poor quality.

*Walker — From southern Georgia, bush medium vigor, berry light blue, large high quality.

Raspberry Varieties

*Gatineau — From Dominion Experiment Station, Ottawa, Canada. Lloyd George x Newman; early, rather dark, lacks flavor.

*Madawaska—From Dominion Experiment Station, Ottawa, Canada. Lloyd George x Newman, very large, early, red.

*Milton — From New York Experiment Station, Geneva, N. Y. A mosaic-escaping red of the Taylor type but brighter red. Season of Taylor. Subject to leaf spot in Maryland.

*Morrison — From Pennsylvania or Ohio. A large, black raspberry, promising in New York and Ohio, but has leaf spot in Maryland.

*Ottawa—From Dominion Experiment Station, Ottawa, Canada. Viking x (Loganberry x Ranere). Hairy-fruited, red, of poor flavor in New York State.

*Rideau—From Dominion Experiment Station, Ottawa, Canada. Lloyd George x Newman. Hardy, large, conic, second early, good flavored.

*Sunrise—From U. S. Department of Agriculture, Beltsville, Md. Latham x Ranere. Very hardy and very resistant to leaf spot and anthracnose. Earliest red, medium size, especially suited to southern raspberry areas from New Jersey to Virginia. Too small where Taylor and other large-fruited varieties can be grown.

*Tennessee Autumn — From Tennessee Experiment Station, Knoxville, Tenn. Tenn. 181 (Latham x Van Fleet) x Lloyd George. Both early—and fall-fruiting, of good size.

*Williamette—From U. S. Department of Agriculture and Oregon Experiment Station, Corvallis, Ore. Newburgh x Lloyd George. Bush hardier and more productive, berry much larger and much firmer than Cuthbert, deep red, medium early, 10 days before Cuthbert. Well suited to long-distance shipping, canning, and quick-freezing. Adapted to Oregon and Washington, not tested enough in East.

Blackberry Varieties

Cascade and Pacific — From U. S. Department of Agriculture and Oregon Experiment Station, Corvallis, Ore. Zielinski x Logan; semi-trailing, of the Young and Boysen type, highest flavor in blackberries, adapted to western Oregon and Washington; season with Young and Logan. Suited to canning, quick-freezing, and preserving.

Merton Thornless—From John Innes Horticultural Institute, Merton Park, London, S. W., England. Hybrid origin. A thornless of the Burbank Thornless and Oregon Evergreen (Black Diamond) type. May be suited to the Pacific Coast regions and possibly to New Jersey.

Currant Varieties

*Cascade — From Minnesota Fruit Breeding Farm, Excelsior, Minn. Bush upright and vigorous, very productive, berries large, dark-red, early to medium season.

*Viking — An old European variety recently introduced; planting permitted in some white-pine blister-rust control areas because resistant to blister rust. Bush upright, vigorous, berries medium size, red.

160 Square Rods

Condensed from Free America

Everett G. Reid

WHEN my wife and I bought one acre of land ten years ago we anticipated the Atlantic Charter by about nine years by establishing as our goal the attainment of four freedoms. We didn't think of them in exactly those words at that time but what we wanted was freedom from want, debt, drudgery, and freedom of enterprise. Or, to use a phrase more popular during the depression, we wanted security. Looking back over the past ten years we feel that even on so small a piece of earth as 160 square rods we have reached a state of independence that is most enviable.

Using land as a source of our living was not new to us. We had tried extensive farming and found it not to our liking. A continuous round of drudgery, worry, and debt does not make for a happy life. In the end the mortgage holder gobbled up the farm and we were distinctly relieved to have finished with the matter.

But love of the soil is something hard to extinguish. The idea of living in an apartment and laboring in a shop was as abhorrent to us as weeding sugar beets on sticky clay in wet weather. The only part of our farming enterprise that had brought us either profit or pleasure had been the garden. This had been planted with enthusiasm in the spring, cultivated hurriedly in mid-summer and harvested in time stolen from the all important work of growing a money crop to satisfy the banker. Our rather haphazard records plainly showed that our garden had been the only profitable spot on the farm. Therefore to obtain freedom from want we would have a garden; to have freedom from drudgery we would dispense with cash farming and to have freedom from debt our garden spot must be small enough to be bought with a minimum of cash. The freedom of enterprise came of having a place where we could do exactly as we pleased.

Our purchase of one acre was not the result of a planned economy. We wanted ten acres but that would have cost seven hundred and fifty dollars whereas we had only seventy-five dollars. So of necessity we settled for one acre. At first we planned to add an acre now and then until our original schedule was anticipated but as time passed and we saw

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with astonishment the great amount of food that an intensively cultivated acre would produce and realized that less land meant less overhead and consequently greater freedom from debt, we decided that our aim would be to see how near to completely feeding a family of four we could come on one acre. After ten years we have come so close to realizing all our food needs from this little patch that the only necessities we buy are salt, sugar, milk, butter, and cooking fats.

By this I do not mean that we have thick steaks from our own beef cattle. By necessities I mean the food that is necessary to maintain a strong and healthy body. As many people are learning in these war days thick steaks are not a necessity. But protein foods of some sort must be eaten, especially by manual laborers and growing children and we have both. Our local state college told us that milk was the most complete of all protein foods and it is certainly the cheapest, so milk is given the job of supplying our proteins. Honey would substitute for sugar if we kept bees but our first hive became foul before a blossom appeared so we burned the mess and decided to buy sugar. Had we foreseen sugar rationing we would have been more persistent.

To an enterprise of this sort dietics is as important as agriculture. We not only had to till the soil but we had to know what to plant to get the maximum food values. At first we grew and attempted to preserve everything. Our garden and closet shelves resembled nothing so much as a seed catalogue come to life and run wild. Little by little we sorted them out, those things we didn't care for and those things that didn't care for our soil. We noted the economy with which one plant could have grown as compared to others of similar nutritional value. Potatoes were a nightmare to us. Bugs and a dozen different diseases called for unending dusting and spraying. Also the price of seed was very high as compared to other vegetables. So we went in search of a substitute. Parsnips and carrots are both highly productive root crops and by looking into the dietic end of the matter we found that parsnips had practically the same nutritive value as potatoes; were, as far as we know, unaffected by pests or diseases but were not quite so high in iron and vitamin B. To supply the iron deficiency we planned to have a green leafy vegetable to supplement our parsnips. This is our way of planning to overcome dietic insufficiencies and at the same time practice the strictest economy of labor, land use, and cash outlay.

Soy beans have rapidly mounted from a decidedly unfavored food to the top of the list. Our first experiment was growing the vegetable type and using them in soups or baked, as navy beans are used, and the result was a complete failure. Their oily flavor was just too much for our taste and this valuable food might have been lost to us had I not nursed a sick Chinaman who explained to me that in his country, where soys furnish so large a part of the diet, they are seldom wasted by being eaten as beans but are sprouted which causes their bulk to increase about three-fold and their taste appeal immeasurably. Now the sprouted soy bean, the ordinary field type, forms the backbone of our diet.

These sprouts are the basis of our favorite food, "available" soup. This is simply soy sprouts boiled in water with a spoonful of butter, and whatever is available is added. This may be anything from a green pepper to dried sweet corn. An onion is almost essential. The protein value of soy sprouts is almost complete. A little milk supplies whatever further protein is needed. As proteins are the costliest foods using this little bean will go far towards reducing the food bill to a minimum. In addition it is one of the greatest soil enricheners. We call it our fertilizer plant. By actual weight the carrots grown in a plot that had grown soy beans the previous year were 30% greater than those grown in a similar plot which had grown peas.

We use currants and rhubarb in place of the regular tree fruits. Here again our reason is economy. Both are heavy producers and require almost no care. We do have a few fruit trees but they are more bother than worth. Tomatoes, melons, and strawberries are also fruit as far as food value are concerned regardless of what a botanist may say to the contrary.

Our success in growing so large a part of our food supply has been largely a matter of adjusting our tastes. We are often asked if our meals aren't unbearably monotonous. How can we stand parsnips instead of potatoes, soybeans instead of meat and rhubarb instead of fruit? Our answer is, "How can you stand to eat bread and potatoes, two of the most tasteless foods, two and three meals a day? How can you stand to drink coffee made in exactly the same way with exactly the same amount of cream and sugar three hundred and sixty-five days a year?"

We have grown both wheat and rye in large enough quantities to fill our bread needs.

In the first years of our experiment we hired a plowman. There are about ten city lots in an acre.

Two are used for house, outbuildings and lawn and one is in perrenials; rhubarb, asparagus, currants, and strawberries. There remained seven lots to plow for which we were charged five dollars. Having the whole place plowed at once was impracticable. Land plowed in early April to accommodate peas would be pretty weedy by June when late potatoes were planted. Now we save five dollars and have the land in better condition by spading it. It looks like a gargantuan task but it isn't. I do it in fifteen minutes a day, six days a week, beginning as soon as the ground has thawed in the spring and continuing until it freezes in the fall. This takes no more energy than my neighbors expend on a game of golf or shouting at the umpire. The fall turned land is ready for early peas and the rest is planted as it is spaded. The garden is divided into plots to facilitate rotation and make the spading job seem less imposing.

Our livestock consists of three does and one buck rabbit, which furnish our Sunday dinners, and twelve Plymouth Rocks which furnish our eggs. All are fed on home grown feed, proso which follows early peas, sunflower seed, rutabagas, and cornstalk. Neither the rabbits nor chickens produce as heavily as they would on high protein commercial feeds but the only cost is labor.

Our outlay for seed is amazingly small. Most of it is home grown including such biennials as root vegetables and cabbage, a very interesting hobby. Certified seed potatoes are our biggest expense and an half bushel of these fills our needs and seldom costs more than two dollars a year. A ten cent package of parsnip or carrot seed produces more food than an half bushel of seed potatoes.

We have found a lot of helpful information in books and articles on vegetarianism. This does not mean that we have taken up vegetarianism as a fad. We like pork chops as well as anyone and when our pocketbooks and ration book are equally affluent we have them (if the butcher does) but we can do without them without suffering malnutrition as would one who was wholly dependent on animal foods for all proteins.

In these days of shortages, actual and threatened, we believe that the best advice we can give any family is "grow your own food and eat it." How much land will you need? Any amount that is available. Some day we may learn how to feed a large family on what is left of a city lot after space has been deducted for a duplex and a two-car garage. It's worth trying.

Methods of Speeding Apple Picking

Condensed from Better Fruit

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A good experienced apple picker picks an apple every two and one-quarter seconds throughout the day. Approximately one and one-half seconds are required to reach for an apple, break it off, and place it into the picking container. An additional three-quarters second per apple is required in setting the ladder, going up and down the ladder, and emptying the picking container of fruit.

Thus, three fundamental parts of picking an apple, reaching for it, breaking it off, and placing it in the picking container require about 6 per cent of the apple picker's time. The remaining 31 per cent of the time requirement is distributed among the jobs incident to moving the ladder and emptying the fruit.

Each fall, apple picking takes its place as one of the largest time consuming jobs in central Washington. During recent years the problem of obtaining enough help to complete this enormous task has become increasingly difficult.

Simplifying the job of apple picking is one of the problems studied by the Agricultural Experiment Station at Pullman. Detailed time and motion records were taken and summarized by the Division of Farm Management and Agricultural Economics.

A score of pickers and the picking of thousands of apples were observed to find ways to increase picking efficiency.

Records of 10 experienced pickers show that an average of 194 seconds was required to pick a box of apples. The time spent in picking the apples from the tree averaged 134 seconds per box. The remaining 60 seconds required per box of apples were distributed among these jobs: going down the ladder, going to the box, emptying the apples into the box, leveling the apples in the box, getting empty boxes, returning to the tree, removing props, moving the ladder, and going up the ladder.

An average of 16 seconds for each box of apples picked was spent in moving and setting the ladder. This is the second largest time requirement in the job of

Reprinted from Better Fruit, Sept., 1944, Portland, Oregon

apple picking. The time spent in leveling the apples in the boxes and removing the props was almost insignificant.

The 10 pickers observed in this study were selected at random from several orchards in the central Washington apple area. They were all experienced pickers, but their accomplishments varied from 75 to more than 200 boxes of apples picked per day.

Time spent in picking apples from the tree decreased consistently as the number of boxes picked per day increased. Likewise, the time for jobs other than picking, such as moving the ladder and going up and down the ladder, decreased as the picking speed increased.

In a few cases a picker would excel in one task but would lag in others. For example, picker No. 5 emptied the apples into the boxes in less time than any other picker. However, he spent more time returning to the ladder than some of the other pickers and ranked sixth in the number of boxes of apples picked per day.

It appears that the greatest difference in picking speed results from variations in the temperament of the workers. The faster pickers usually took less time for each part of the job. Each movement was rapid and positive. There were very few waste motions.

Of the 5,000 apples recorded, 43 per cent were picked by the left hand and 57 per cent were picked by the right hand. The number of apples picked by the left hand varied from 35 to 50 per cent. There was no apparent difference in the picking speed associated with the variations in the use of the left and right hands. These pickers made satisfactory use of both hands.

Pickers who broke off two or more apples in the hand before placing them in the picking container tended to pick more of the double and triple apples in the right hand. The left hand picked a greater percentage of single apples while the right hand picked the greater percentage of doubles and triples.

Some pickers increased their efficiency by picking two or three apples in the hand for each delivery to the picking container. Other pickers were most efficient when they picked only one apple at a time. The speed of each movement was far more important than the manner in which the apples were picked.

The study shows that by far the greatest amount of the total picking time is required in picking the apples from the tree and handling the ladder. Therefore, the greatest possible savings of time could be expected in these operations. As a result of these preliminary investigations further study in being directed to-

wards simplifying these particular operations.

Plans are being developed for improved picking containers and picking ladders. The equipment will be characterized by an improved design and reduced weight.

Use of the picking bucket was studied in detail. A number of the faster pickers desired a container large enough to hold a box of apples. The picking bucket commonly found in use was designed to hold less than a box of apples. Many pickers were adapting the bucket to hold a box of apples, but at considerable inconvenience.

An attempt was made to design a picking bucket so the pickers could carry more apples and less bucket. A bucket of light metal alloy was designed large enough to hold a box of apples. It weighs about one and one-quarter pounds compared with about five pounds for the smaller galvanized sheet metal buckets. The cost of the material is about the same.

Perhaps when light metal alloys become more readily available, even greater benefits to pickers can be made with lighter picking ladders. A 12-foot orchard ladder has been designed that will weigh approximately 25 pounds.

Adequate equipment is a basic essential for efficient work. The method of doing a job is also important. In apple picking, arrangement of the boxes, the method of emptying apples into the boxes, and the method of moving and setting the ladder influence the efficiency of the worker. The study of these methods is being continued.

Achievements that can be made in apple picking are influenced to a considerable extent by the temperament of the worker. However, other factors such as methods of picking and type of equipment also influence the achievements. These latter factors are the ones that can be changed and improved. An apple picked every two and one-quarter seconds is a high goal for most pickers, but even such records can be improved by analyzing the job.

Improved Broiler Feathering

Condensed from American Poultry Journal

D. C. Warren

POULTRYMEN have noted for many years that there was a group of breeds characterized by small body size, a nervous temperament, by acquiring their chick feathers early and by laying white shelled eggs. Another group was contrasted with these in all the named characteristics; that is, these birds possessed large body size, docile dispositions, lateness of growing feathers, and a brown shelled egg.

The breeds feathering out at an extremely early age are the Leghorns, Minorcas, Anconas; while the larger breeds showing later feathering are the Plymouth Rocks, Orpingtons, R. I. Reds and Wyandottes. Some of the males of the last named breeds were virtually grown before they acquired a good covering of feathers. However, this seemed to be a minor problem since they eventually were as well feathered as any other rooster, even though they sometimes experienced a case of sunburn in midsummer. To the farmer's wife, who wanted a good frying chicken, they indeed presented a more serious problem of preparation for the skillet, but she accepted the time-consuming job of picking pin-feathers as a part of her task.

It took the poultry processor, who keeps a more accurate account of labor costs as well as the appearance of his finished product, to bring to the attention of the poultryman the fact that the breeds which had this late feathering tendency were not all that was to be desired. When the poultry packer placed a discriminatory price against the so-called "bare-backs," the poultryman became concerned as to what could be done about the matter.

Scientists interested in inheritance studies had investigated the mode of inheritance of differences in feathering in poultry. They had found that the difference between Leghorns and heavy breeds in the age at which they acquired feathers was simply inherited and independent of other traits of the respective breeds. Even with this information at hand, poultrymen had hesitated to try to breed the undesired late feathering out of the heavy breeds of chickens lest they also turned them into chickens of the Leghorn type. The re-

Reprinted by permission from the American Poultry Journal, Dec., 1944, Chicago, Ill.

cently introduced New Hampshire breed is a demonstration that their Leghorn type of early feathering does not necessarily bring with it the Leghorn body size.

In recent years, considerable study has been made of the inheritance of rate of feathering in breeds of chickens at Kansas State College. Work has also been done there toward the conversion of feathering type of some of the more popular heavy breeds such as R. I. Reds, White Plymouth Rocks, and Barred Rocks. Inheritance studies have shown that the difference in rate of feathering of Leghorns and heavy breeds belongs to a group known as sex-linked characteristics. If the cross is made between an early feathering male and late feathering females, it gives "criss-cross" inheritance — the daughters will be early feathering like the father, and the sons late feathering like the mother. If the reverse cross is made, using the late feathering sire with an early feathering dam, all offspring will be late feathering.

Broilers from early feathering breeds have completely feathered bodies, while those of the heavier breeds may be largely lacking feathers or covered with troublesome pin feathers. The "bare-backs" are more common among the males which are usually sold at that age. The inherited differences in feathering may be recognized at a much earlier age than that of the broiler.

At the ten-day age, early feathering chicks possess well developed tails, while late feathering chicks are completely lacking in tails. On the day they are hatched, early and late feathering chicks may also be recognized, since the early feathering chicks have several well developed spike-like wing feathers, while the late feathering ones have wing feathers, which are scarcely visible in the down. Although it is somewhat easier to distinguish early and late feathering by the presence or absence of tails at the ten-day age, for hatcherymen and others, it may be more satisfactory to make the identification at the day-old age.

In making the examination, the chick wing should be spread and held between the eye and a source of strong light (table lamp or window). The wing shows two sets of feathers, the outer 7 or 8 long feathers (appearing as spikes in newly hatched chicks) being known as primaries, and an equal number of secondaries comprising the section of wing feathers next to the body.

Each primary feather of an early feathering chick has beside it a covert which is about two-thirds or three-fourths the length of the primary. It is this relationship between the length of the

primaries and the coverts which distinguishes an early feathering chick from a questionable type of late feathering chick that has rather long wing feathers. If one considered only the length of the flight feathers, a chick of this type might be classed as early feathering, but a closer examination will show that its coverts are virtually as long as the primaries.

This intermediate type of late feathering (probably chicks which hatched very early) has sometimes been confusing to beginners when identfying early feathering in day-old chicks. In most chicks, the length of the flight feathers will readily distinguish early and late feathering chicks, but if in the questionable ones, the primary coverts are examined with the foregoing in mind, the problem is simple. The feathering of the broiler will also be improved if the day-old chick has five to eight well developed secondaries instead of two to four.

If we are breeding for improvement of broiler feathering, some might wonder why not confine our observations to that age chicks. When early feathering, as recognized in the day-old or ten-day-old chick, is established in a strain, it may be well to cull out at the broiler age any individuals that do not have perfectly feathered backs. They will be few, if any. However, if one confines his selection to the broiler age, it will be difficult to establish a strain which will be free of bare-backs under all conditions.

Although the early feathering tendency of the Leghorn is not usually found in heavy breeds, such individuals may be occasionally found in many strains of heavy breeds. Elimination of bare-backs may be accomplished by seeking early feathering individuals and using them as breeders. Some of the more progressive breeders of the larger chicken have become interested in selecting for improved feathering and have made the conversion here advocated. One can make the beginning of improvement by purchasing breeding males from such flocks. In order to make certain that one has the true early feathering, it is not sufficient for the male to be well feathered at the broiler age, but he should also show the trait at hatching and at the ten-day age.

If one finds an occasional early feathering chick in a heavy breed flock, it is most likely to be a female. Because of the criss-cross type of inheritance, it is desirable to have an early feathering male. If such a male is mated with late feathering females, the daughters will all be early feathering. Then if these early feathering daughters are mated with another early feathering male (not their father to avoid inbreeding), they will produce sons and daughters all of

which will be early feathering. Thus it is seen that by purchasing a few early feathering males one can transform his entire flock from the late to the early type of feathering in two years, and it will breed true thereafter unless new blood is introduced.

If one finds early feathering chicks in his own flock, marks them, and mates such males and females, he can make the conversion in a single year. If one finds only early feathering females, he may mate them to any late feathering male, and their offspring will all be late feathering. Their late feathering sons, but not their daughters, will transmit the early feathering tendency. Thus if such late feathering sons are mated with other early feathering females, not their mother if other such females are at hand, they will produce some early feathering sons and daughters. If the early feathering females and males thus obtained are mated together, they will originate a true breeding, early feathering strain.

The science of genetics (inheritance), therefore, offers to the poultryman a simple and prompt solution to a troublesome economic problem. It is true that management factors influence the rate at which heavy breeds acquire a covering of feathers, but the incorporation in heavy breeds of the early feathering trait largely solves the problem under all conditions. In view of the interest manifest among poultry breeders, it seems probable that in the next few years the bareback problem will be solved in our more popular heavy breeds by converting them to the early feathering type. The poultryman selling breeding stock of any heavy breeds, which does not possess the early feathering trait, is likely in the near future to find himself in an unfavorable competitive position.

The Story of Meat

Condensed from Coastal Cattleman

Prepared by Agricultural Research Department, Swift & Company

One dares not conjecture when mankind reached that point when cookery was first employed. One may only surmise that it was not long after the invention—or the discovery—of fire. That date is lost in the utter darkness of the past.

When our earliest records begin with the crude carvings of cave dwellers in middle Europe and the monumental inscriptions of Egypt and Assyria, cookery was already a highly developed art. Almost all the primitive people had the legend in some form or other that the roast of sheep and goat was acceptable as an offering to their dieties.

Meat preparation among some of the ancient civilizations of Assyria was apparently considered of so much importance as to be semi-sacred; only the priestly order could engage in it. The Egyptians are recorded to have had food laws in which the priests were judges of meat. Among the Hebrew patriarchs of the earliest times, "burnt offering"—or roast—was a frequent sacrifice on their altars. It is well known that the stringent butchering regulations of the Israelites under Mosaic law are virtually in force among the Orthodox Jews of today.

How Meats Got Their Names

The common names for meats give us a peep into the way in which our language has grown up. After the Norman conquest of England, the language of the Court and what we should today call the "polite set" was Norman-French. But the common people, those who tended the cattle and hogs and sheep of the conquerors, continued to speak their native Middle English dialects. When their fatted animals were brought to the households of their feudal masters, Norman-French retainers served them under the names of "boeuf," "vielle," "porc," and "mouton"—beef, veal, pork, and mutton—names which then were the Norman-French for the self-same live animals that the native underlings called kine, calves, swine, and sheep. Gradually, when the fusion of the two races took place, the distinction became fixed. So it came about that our composite language acquired two useful sets of words to describe the live animals and their meat.

Reprinted by permission from the Coastal Cattleman, Feb., 1944, Beaumont, Texas

Indeed, the modern French have borrowed back at least one term lent us by Norman-French. The "rostbif" of a Parisian restaurant is only an adaptation of "roast beef."

The cattle now in America came from two parent sources. One was the Mexican herd of early and dramatic origin; the other herd was brought together upon the Atlantic coast in more commonplace fashion through piecemeal importation from Europe.

Glance for a moment only at the more romantic branch of American cattle. Early in the sixteenth century, Hernando Cortes, Spanish conquistador, landed on the Mexican beach near Vera Cruz, with 16 military charges and a few Andalusian cattle. After the first warlike successes, Cortes' men ceased to be soldiers and became settlers: diverting their animals from the prior goal of war, they set up the business of raising livestock—founding the wild Texas "Longhorn" tribe.

Of more importance, however, has been the development of the Atlantic source of American livestock. Meat from the native wild animals had, presumably, always formed part of the food of the aboriginal red Indians of North America just as it does today among the races of Central Brazil. Perhaps the first white settlers took some ideas from the Red Men, for quite early in the records of New England, one may read that farmers cured, smoked, and packed meats for the trades people and merchants of their communities.

Whatever methods the Colonists may have taken from the natives, they wisely did not depend upon wild animals for a supply of meat. To have abandoned the tried domesticated animals of Europe for the uncertain supply of the hunt would have been like giving up fire-arms for the Indian's bow and arrow. From the first the importance of meat was recognized. The earliest authentic record of swine importance into this country, however, was in 1538. These were brought from Cuba to Florida by Ferdinand de Soto. Newfoundland and Nova Scotia received cattle and hogs from Portugese traders in 1553. Although some cattle reached Virginia prior to 1609, the first considerable shipment was in 1610. The first sheep were brought from England to Jamestown, Virginia, in 1609.

In New England, dairying, cattle feeding, and hog raising were carried on together. By the middle of the seventeenth century an important cattle industry had developed in the Connecticut River Valley. From the pastures of New Hampshire and Vermont large droves were annually driven south to be sold at Boston

or to feeders and dairymen in the three southern New England states. By about 1772, settlers from Virginia and Pennsylvania had reached the Monongahela Valley, where herds of 400 or 500 head were soon common.

Though hogs were brought by the first settlers to supply their own daily meat, they soon became an article of trade and a source of income. Early chronicles show that several of the northern colonies exchanged a surplus of pork with the West Indies for sugar and rum. But in the 1640's when the Civil War of Cavalier and Roundhead was absorbing the utmost resources of English merchants, the Colonists took over the whole trade of supplying the West Indies with livestock, barreled beef and pork, bacon and hams. The meats were "packed;" that is, "salted down" and packed in barrels. The first American to give his whole time to the business of "packing," so far as can be known, was William Pynchon, of Springfield, Massachusettes. The name "packer" has been used since that time, although "packing" comprises only a small part of modern meat preparations.

Following 1812, agriculture developed rapidly in Ohio, Kentucky, and Tennessee. The most important products were corn, hogs, and cattle, and the first named was marketed principally in the form of livestock driven afoot to market.

In the Ohio River Valley, farmers found that large crops of corn could be raised easily and cheaply. As they had no local market for this corn, they fattened cattle and drove then across the Allegheny Mountains to the eastern markets, where they competed successfully with cattle feeders of the East. Even hogs were driven east to Philadelphia and Balitmore and south to the cotton-producing regions.

Slaughtering for shipment down the Ohio and Mississippi Rivers to New Orleans, where the meat was consumed or reshipped to Atlantic coast points and abroad, began about 1820. As early as the year 1840, commercial operations in pork packing began in Cincinnati. During the two decades preceding the Civil War the city rose into prominence and was known as "Porkopolis." Here, as in Buffalo and the East, operations in packing were practically confined to the winter months. All of the pork was cured or "salted down," for the marketing of fresh meat was out of the question. Slaughtering methods were crude. Everything was done by hand.

The development of the livestock industry in the West constitutes a thrilling chapter in American history.

An interesting writer on the

Great West has stated: "The story of America's cattle trade is one of the most romantic tales of modern times. In its swing and its dignity, it truly is a saga. This story deals with more than mere meat, hides, and tallow; for its cogent, salient chapters have as much to do with men and their achievement as with animals and their products. It is concerned as much with the cowboy as it is with beefsteak."

As the East turned more and more to manufacturing and commerce, with great cities and thickly populated industrial states, meat production on a larger scale became necessary to supply the consumers. For the first time there grew up in the West large ranches under one management for meat production. The undeveloped lands furnished ideal conditions for the new development.

With farsighted vision, the pioneers in the packing industry, anticipating this economic outcome, established their business nearer the source of raw materials. Buffalo and Cincinnati, and later, Chicago and other midwestern cities, became the leading packing centers.

After railways were built, cattle were carried long distances in cars, though the expense of the journey was relatively great and the loss from injury and death was large. Hogs could not be killed on a commercial scale except during the winter months, because there was no way of distributing the product quickly or of properly preserving it in summer time.

It is the claim of the meat packing industry that slaughtering under the factory system forms one of the most efficient and economical steps in meat purveying from farm to table. Soon after they are purchased in the stock yards, the animals pass one by one along a narrow alley in the packing house and are promptly slaughtered by gangs of men so arranged that, as soon as one animal is disposed of, another at once takes its place. There are differences in practice but the underlying principle of the modern method is, as a rule, that the product is conveyed to the worker for one specialized piece of workmanship and is then conveyed to the next. Each man has this particular task which he performs as the chain moves steadily forward. This specialization in operations leads to great skill on the part of the workmen. Output under such a system is both standardized and economical. At every step the most scrupulous cleanliness is observed. Indeed meat had never been so hygienically prepared, handled, and distributed before the coming of modern packing house.

The fresh meat is placed for several hours in what is called the "cooler" and in the case of dressed hogs is cut up into the parts familiar to all at retail shops. Beef is usually served on the family table within a fortnight of the time the steer leaves the farm. But some other meats require long processing, or curing, before they are ready. Bacon and hams are examples. Pork sides are cut according to need and local customs, but in the main it may be said they follow a division comprising hams, shoulders, bacon, and loins. For some trades, such as export to Great Britain, a small part of the pork supply is handled in whole "sides."

Of course, the whole of any animal, however good, is not all meat. There naturally is shrinkage even under modern methods of preparation. The amount of meat varies from animal to animal or, in butcher term, its "dressing" varies. In general, however, the yield of meat ranges from 50 to 55 per cent of the live weight of all cattle marketed, from 45 to 50 per cent of all sheep, and from 70 to 75 per cent of all hogs marketed depending upon weight and finish. Prize and show animals ordinarily rank higher in this particular. The United States Department of Agriculture estimates that two-year-old prize and show steers at the International Livestock Exposition yield 66 per cent; 85-pound wethers, 58 per cent; and high-class 300-pound hogs, 82 per cent.

There should be mentioned one of the most noteworthy, if not epoch-making developments of the packing industry—the by-products, so-called. In general, they may be defined as anything from a hog, steer, or sheep not considered as meat proper.

In the old butchering days these were thrown away and wasted because their value was not understood and because no means existed to turn them to account. Today they are taken by specialized trades which have sprung up and which owe their origin wholly to the fact that the raw material for their use has been made available by recovery from packing-plant operations. A few uses only of recovered materials need be mentioned: glue, soap, oleo oil (which gives its name to oleo-margarin), stearin, casings (for sausage), gut for musical instruments and tennis racquets (from sheep intestines). Leather from the hides has a record going back to high antiquity. Others fairly well known are the horns and hoofs, which, after subjection to the action of steam, are laminated, or split to make combs, brush handles, and similar things. Bones are used for knife handles, knick-knacks,

dice, etc. Blood is utilized in some cases to furnish albumen, but chiefly, with the odds and ends of meat, fat, and residue, which cannot otherwise be turned to account, the blood in a packing house is made into fertilizer.

Yet, it is perhaps in the field of the pharmacist that the rather prosaic by-product finds its most surprising applications. Pepsin is one of the most widely used bases of remedies for dyspepsia; surgeons now use ligatures made of sheep intestines for sewing wounds. In some surgical operations a substance which comes from the adrenal gland near the kidneys is employed to prevent hemorrhage, and kephalin, also is used because it clots blood and acts as an astringent. A third substance, lecithin, is used to counteract snake poison and the venomous sting of insects. Other materials used in medicine and surgery obtained from the brain of cattle are the pituitary and pineal substances. Pancreatin is a digestive ferment; insulin, a discovery for the relief of diabetes, is obtained by a distillation process from the pancreas; from the thyroid glands of sheep, preparations are made that are prescribed in case of premature bonehardening. In fact, several other medicinal preparations are made today from what were formerly wasted portions of meat animals.

One could scarcely conceive the packing industry without its by-products. Because of the inclusion of by-products in the value of the meat animal when bought, the packer can, and does, pay a higher price for it to the farmer-producer. On the other hand, because by-products have a value when sold that goes to meet the first cost, the packer can sell, and does sell the total meat at a lower return than would be necessary were there no by-products to make up the difference. Thus, producer and consumer of meat benefit, and the manufacturer of the by-products has something valuable to process further and to turn to human use. The farmer gets relatively more and the household buyer of meat pays relatively less money than would be obligatory if the numerous by-products were still not utilized as in the old days.

Sweet Potato Culture

Condensed from Market Growers Journal

PROBABLY no vegetable has come to the fore so rapidly as a substantial part of the national diet as has the sweet potato during this war emergency. Part of this popularity is due to advertising and promotion, but a good share of it is due to the excellent eating qualities of the sweet potato itself.

In 1939 a total of 1,163,719 farms were listed by the U. S. Department of Census as growing sweet potatoes, with a total acreage of 696,474. Three-fifths of this entire acreage was located in Louisiana, Alabama, Mississippi, Georgia and North Carolina. Sweet potatoes are grown as far north as southern Indiana and Missouri.

The sweet potato is one of the most important vegetable crops of the south, and with new methods of turning the sweet potato into meal for stock feeding, and dehydrating for preservation, the sweet potato is reaching national importance. It is a major food crop for the south, as well as an important livestock food, and the recent development of the sweet potato starch industry opens more possibilities.

Probably the most widely planted variety of the sweet potato is the Porto Rico, which is best adapted for the extreme south and is planted extensively in Louisiana, Georgia, and Maryland.

The Porto Rico is known as a moist-type, while northern growers in Indiana prefer the dry type and have used Little Stem Yellow Jersey to great extent. A few of the moist types such as Porto Rico (Pink Skin) and Nancy Hall (white skin) are also grown in the north.

There are also some intermediate types of sweet potatoes, such as Triumph, which is grown to some extent for early shipment north; Southern Queen, which was popular at one time, and Porto Blanco, a mutation of the Porto Rico, which is largely used for cattle feeding.

Soil is not an important factor in sweet potato production, as they can be grown on most any type providing it is well drained. The silt loam soils of Louisiana are largely used for commercial production and result in high yields. Light sandy loams, however, give best results, and sandy

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soils are not favorable for high production.

A common practice is to dip all seed stock in a solution of corrosive sublimate, using one ounce to eight gallons of water, and allowing the stock eight minutes to soak. From 1,500 to 2,000 plants may be obtained from a bushel of Porto Rico variety and will require about fifteen square feet of plant bed. The common practice in the southern states is to pull slips from the plant bed for setting in the field. In some cases vine cuttings are used, but this usually results in lower yield. In southern Louisiana plants are grown from early set slips and vine cuttings taken from them, which prevents the transfer of disease or other from the mother stock to the cuttings, as vine cuttings are made above the ground.

While sweet potatoes will produce on almost any type of soil, fertilization will result in better production. Usually an application of 400 pounds per acre of 4-8-4 or 600 pounds per acre in the case of extremely poor soil, will result in better yield.

It must be remembered that in order to produce a good crop, good seed stock is needed, and experience and care in bedding necessary. Stock for plants should be uniform in type and color and come from certified stock or vine cuttings. Probably the easiest method of bedding sweet potatoes is to construct an ordinary, dirt-banked bed with old boards and cover with a cloth such as unbleached sheeting, allowing about twelve square feet of bedding space for each bushel of potatoes. A layer of thoroughly mixed fermented manure is placed at the bottom of the bed and about an inch of clean, sandy loam is placed over the top of the manure. Next the potatoes are placed in the soil firmly and as near together as possible without touching.

A covering layer of the same soil is used to cover the potatoes to a depth of about one inch above their tops, using one pound of good fertilizer for each bushel of potatoes. Plenty of water is necessary, and should be repeated every three to four days. In order to develop a good root system a layer of one inch of clean sand can be used to cover the plants as soon as they break the surface.

Small plants will not live in the fields, so care should be taken to transplant only good average-sized plants; pulling only a short time before transplanting, or pulling ahead of time and setting in water and clay.

In preparing the soil for the plants, harrowing is the most important phase, as it is not necessary to plow as deep as for other crops, and a good harrowing job will leave the soil well pulver-

ized. Fertilizer is then applied and the soil ridged over the fertilizer. These ridges are usually smoothed over before planting to kill off the weeds and it also makes for easier transplanting. This is usually done by the attaching of a board to the cultivator or plow stock covering two rows at a time.

Plants are put in the fields as soon as the danger of frost is over, which is usually about the middle of March in south Georgia, and progresses to about April 15 in north Georgia. It is usually not necessary to use water in transplanting, if the weather is rainy or the soil is moist, but the application of about a pint of water per plant is necessary if the field is dry.

Some growers give the plants a quick start by using about two pounds of nitrate of soda in each fifty gallons of water. Planting machines similar to tobacco planters are used on large acreages. About two to three days after planting wilted plants should be replanted. For maximum yield about thirty-four inches are allowed between rows and fifteen inches between plants in the rows. This spacing will require about 11,000 plants per acre.

Sweet potatoes need clean cultivation, and hand hoeing is essential immediately after planting, and plow cultivation every week until the vines meet between the rows. Harvesting is easier when the rows are clean and free from grass.

Some growers use the last cultivation to hill the rows, but in most cases moderate hills are used.

For the early market sweet potatoes are usually harvested in late summer, using a plow such as the colter-type vine cutter or the knife-type vine cutter to cut the vines and turning the potatoes out with a walking plow. Potatoes should be gathered as soon as dug, and in no case should be exposed to the sun more than thirty minutes. If exposed for any length of time in wagons or banks they should be covered with a canvas or burlap.

Tomorrow's Farm at Today's Prices

Henry G. Beckman

Wise men turn to the history of the past to find guidance for the present. In no sphere of the economic world is this saying more applicable than in agriculture. It is particularly pertinent in view of the violent fluctuations that occur in the price of farm products over a term of years. Practically all farm products that are produced in any quantity share in this instability of prices. The accompanying financial calamities that attend sudden and extreme price variations make up one of the saddest pages of American life, tragedies that have touched the lives and broken the health, morale and social perspective of millions of farm people.

To understand the social perspective of any group of people one must know something of the antecedents of that group and of the things that have brought about their contemporary outlook. Generally speaking, we have come to accept a certain amount of pessimism as an inseparable part of a farmer's nature. In a large measure this attitude has been brought about by the hard-luck experiences through which he has passed. These experiences have left upon him certain impressions that have colored his entire outlook. Crops that gave great promise have been ruined by excessive moisture, and weeds which, under the circumstances, he could not control, have greatly reduced returns. If he farms in the midwest, hot winds and drought shrivel his crops as well as his hopes. In the north the season's promise is cut short by an early frost. In the south pests destroy his crops or heavy winds lay them flat. So from east to west, from north to south, the farmer is faced with uncertainties that have tended to make him pessimistic in his outlook upon life.

Next to the uncertainties of production is the problem of constantly fluctuating prices which a farmer receives for his products. In seasons of good crops and heavy yields he faces a burdensome surplus. When crops fail he is in no position to take advantage of the increased prices. Many, perhaps most, farmers have not been in a position to hold their surplus crops over in years of abundance in order to take advantage of increased values in deficit years. Many crops, too, like potatoes, fruit and vegetables are perishable and cannot

be held over a year under ordinary farm conditions. All these things have produced a price situation of which dealers and speculators have been quick to take advantage and further depress the price of products at the farm.

Naturally in so significant an industry as the production of food crops a great deal of thought and effort has been given to the question of a better stabilization of the returns to the man who produces them. Proposed remedies by the hundreds have flown from the pens of would-be benefactors.

From the grist mill of the heterogeneous efforts of the past half-century, however, there have come some constructive efforts that have been highly effective in bringing some measure of relief. Many well-founded movements, cooperatives, and marketing arrangements are now incorporated in the pattern of American economic life and are adding materially to farm returns and to the stability of farm prices for certain products.

Parallel to the ups and downs that make up the chart of prices for farm products is another significant factor that has, perhaps, ruined more farmers financially than poor crops or poor prices. It is of particular importance just at this time because its dangers are more imminent than they have been for several years. The one thing that needs emphasis at this time is that here is one danger that is entirely within the power of the individual farmer to avoid. We refer to the matter of present farm land prices.

Practically speaking, no section of our farming country is now immune to the inflation that is affecting the price of land. It is true that some sections have experienced farm land price inflation to a greater extent than others, depending somewhat upon the nature of the crops produced and in some instances, upon the migration of large numbers of people due to the war industry demands. In areas of intensive production of vegetable crops near war industries small farm units have doubled in value since 1938. Throughout the great midwest values, as reflected by current sales, have shown marked advances over a few years ago. Demand and the number of sales all give evidence of a mild boom, to say the least, which has sent prices up to levels that within the last ten years would have seemed all out of proportion to their long-time production values.

What will today's farm cost in terms of tomorrow's prices for the products it produces? Let us go back just a little way into the past and see what happened to farm prices following the last war. It will be remembered that during the peak of farm pros-

perity farms in the state of Iowa sold for $200.00 per acre and up. Corn reached $2.00 per bushel. Farms in the irrigated areas of the southwest ranged from $400.00 up to unbelievable heights. To the conservative thinker this page from the history of the past provides some excellent food for thought.

It is to be remembered here that the farmer is not operating in the money market. The dollar is not his commodity. In other words he is not in the money business. He is primarily in the crop or livestock business. Money, the one hundred cent dollar, is only the medium of exchange by which he discharges the obligation he assumes when he buys his farm. His ability to discharge that obligation in dollars depends entirely upon the number of dollars he can buy with the crop or farm produce that he is producing. That number will vary from year to year and may, if farm history repeats itself, go to such extremes that his year's work will enable him to buy relatively few of them. Meantime his obligation remains fixed. He owes the same number of dollars, regardless of the size of the dollar in terms of his effort.

If, in the next ten years, farm prices follow the same trend they did at the time of the last depression, some serious things may happen to the man who now rushes in to buy land at inflated values and small down payment. Assuming that the buyer of $200.00 land pays 4½% interest and ½% for taxes and minor incidentals of maintenance, and takes twenty years to pay out, simple interest, computed either on the mortgage or on the investment, would amount to $10.00 per acre per year, or $200.00 for twenty years. Unless one has happened to have given this a moment's thought the total amount of money tied up per acre staggers one. But this is not all that needs to be kept in mind.

If the original $200.00 were paid off at present prices for farm products it would not be such a difficult matter. Paying off with prices that have prevailed over twenty year periods, particularly those periods that have followed times of farm prosperity, is quite a different and a far more difficult matter. With corn at $2.00 per bushel, a price reached during the last boom, 100 bushels would pay for an acre of $200.00 land. But within a period of very short time during the calamity that initiated the last depression, corn dropped to 35 cents per bushel to the farmer. Then it took 570 bushels of corn to pay for the acre of land upon which the buyer still owed the same number of dollars. At 60 bushels per acre, averaged over a

long period, it would require the product of this land for nine years to pay this obligation. Meantime the interest and taxes have piled up to $90.00 per acre in these nine years. Few farms can be corned successfully for thirteen years in succession and other crops might and probably would be less profitable. Nor does this take into consideration the possibility of crop failure which may occur within such period of time.

Of course corn does not stay at 35c for a long period of time but the illustration gives one an extreme picture of a situation that might occur in a milder form when one's speculative enthusiasm outruns his calmer judgment.

Because of constancy of the fixed investment price cycles of farm land are more significant than cycles in crop prices. In periods of low crop prices production costs usually have a tendency to move downward as well, and some relative measure of relief is afforded the producer in his costs. That condition does not prevail in regard to the land itself.

Another factor that deserves careful consideration at the present time is the fact that land bought in a depression period stands a chance of being paid for with crops that are sold later on during periods of farm prosperity, whereas land bought at boom prices can scarcely escape the nightmare of depression prices and boom-time obligations. To illustrate this point let us take the recognized mortgage lifter as a criterion. Land bought at $125.00 per acre requires 900 lbs. of 14c live pork to pay out. Five hogs weighing 180 lbs. will suffice. But land bought at $175.00 requires 16 hogs weighing 180 lbs. when the price has gone down to 6c per lb. These prices do not represent the widest extremes in price fluctuations. Six cents would have looked very attractive to farmers during the depression and $175.00 was by no means exorbitant for good corn land during the boom.

Does our present situation represent a parallel to the former calamity that swept so many midwest farmers off their feet? In a lesser form we believe it does. Granted that much good advice and warning has been issued and that certain nation-wide movements have been started to prevent financial chaos both in agriculture and industry, the current situation contains some elements of danger that the individual farmer who is contemplating buying high priced land can help to avert. Land prices boom when there is a demand for land regardless of whether that demand is created by surplus capital seeking permanent investment in tan-

gible property or by the farmer who has just sold his products at wartime prices and is leaning over the fence, looking with covetous eyes at his neighbor's field. His present enthusiasm may contain the seeds of future pessimism. It may be a good time for caution. His future optimism may in a large measure depend upon the conservatism, even that native pessimism with which he views the current picture.

Sprouted Soybeans Save Feed

Condensed from New Jersey Farm and Garden

Two wartime expedients for the poultrymen have recently been tried out with satisfactory results in the poultry department at the New Jersey Experiment Station. The first is the use of sprouted soybeans with a mineral supplement to save mash and grain in the poultry ration. Over a three-month period, this feeding practice resulted in a saving of thirty-five per cent of the mash and twenty-one per cent of the oats consumed by a pen fed in the usual way. Total feed consumed by the experimental pen was about ten per cent more than by check pen, but the cost per dozen eggs produced was less with the soybean feeding. Average egg production for the three months was fifty-seven per cent for the pen fed sprouted soybeans, compared with fifty-three per cent for the pen on standard rations.

All feeds were purchased on the open market. Thus the farmer who raised his own soybeans would show a still greater saving in feed costs. The experiment will be repeated over a longer period, with more detailed observations of effects of the experimental ration.

The other project dealt with the effects of restricting grain feeding to limited periods. One pen in the test was given grain only between 8 and 9 A.M.; another received its grain from 4 to 5 P.M.; and the third had grain available during both periods.

Egg production for a period of approximately five months was sixty per cent for the pen receiving grain in the morning, fifty-four per cent for the pen which had its grain in the afternoon, and forty-four per cent for the pen receiving grain at both periods. The high production pen also showed the lowest mortality and the highest ratio of eggs produced to feed consumed. The practical significance under current conditions is that the restriction of grain feeding resulted in greater consumption of mash with consequent savings in total feed costs.

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Calf Pills — A New Feed

Condensed from Successful Farming

Paul H. Phillips
University of Wisconsin

THE idea of "pill-feeding" calves is new but sound; it definitely has scours and allied diseases on the run. In no other way can some of the vitamin supplements needed by calves be safely stored and fed with the ease and convenience afforded by a tablet or capsule.

Objection has been raised to this practice on the grounds that it puts calf feeding in the drugstore. Recent developments in commercial feed channels have put this method of supplementing calf rations on a sound, practical basis within the reach of all farmers.

Approximately 90 percent of all scours and allied diseases of calves are directly related to nutritional causes.

Frequently death from rapidly-fatal scours occurs in very young calves. The occurrence of this type approximates 10 percent of the scours encountered on the farm. The symptoms of this type of case progresses as follows: The calf arrives normally and appears healthy, vigorous, and bright. It will nurse, but soon shows acute distress; eyes become listless and sunken; the calf loses interest in its surroundings, lies quiet, scours, loses its appetite, and dies within 48 hours of birth.

Chemical analyses of the blood of such calves indicate subnormal Vitamin A and C concentrations. These cases are also accompanied by active bacterial invasion.

Nutritional therapy alone is not sufficient to control this type of disease. It has been found that a combination of sulfa-drug administration together with vitamin supplementation, including ascorbic acid (to be described), will save practically all of such cases. It thus appears that proper and adequate calf nutrition assures us of practically a 100-percent calf crop.

Vitamin supplementation in calf feeding is done for the express purpose of assuring adequate amounts of certain vitamins—Vitamin A and niacin (nicotinic acid) for the prevention and treatment of "scours" or diarrhea in calves; Vitamin D for the prevention of rickets; and ascorbic acid (Vitamin C) to help control infections.

Reprinted by permission from Successful Farming, Dec., 1944, Des Moines, Iowa

The daily requirements for these vitamins are approximately 3,000 International Units of Vitamin A, 25 milligrams of niacin, 200 units of Vitamin D, and 125 milligrams of ascorbic acid for a 100-pound calf. In order to be on the safe side in all cases, these requirements have been approximately doubled. The amounts recommended for the control of calf diarrhea are: 5,000 units of Vitamin and 50 milligrams of niacin daily. To these are added 500 units of Vitamin D to supply the sunshine vitamin and thus avoid calf rickets.

Ascorbic acid is included at the rate of 250 milligrams in some preparations for the purpose of aiding in the control of navel as well as other infections or diseases causing fever in the calf. Since the latter can only be *fed* to the calf for the first 10 days of its life, it is a waste of this vitamin to feed it to calves beyond that age. If ascorbic acid is needed after the calf reaches this age, it is necessary to inject it under the skin because the bacteria of the rumen destroy it when fed.

These amounts and terminology are of more significance to a scientist than to the average farmer, but nevertheless their mention in this article can help guide the buyer of calf pills when he examines the label on the box or bottle. Some commercial firms have been inclined to skimp on amounts, and this tends to reduce the value of the product.

Because of the destruction of ascorbic acid in the rumen, two types of mixtures have been used. A capsule containing Vitamin A, ascorbic acid, niacin, and Vitamin D has been manufactured. Such a mixture will largely prevent or cure scours and aid materially in guarding against these infections.

A second capsule has been made without the ascorbic acid. Except for helping to combat infections, this capsule can do everything claimed for the first one. It is advisable to use both kinds of capsules. For the first 10 days, feed the one containing ascorbic acid, and use the second for as long as desired thereafter.

Recent technical advances have made it possible for manufacturers to make sealed gelatin capsules or pressed and coated tablets in which the Vitamin A is stored without much loss for a year or more. In this form the vitamins can be given by placing the capsule or tablet in the calf's mouth, and he will suck it down readily.

These particular vitamins are needed by the young calf for the following reasons: (1) The calf is born deficient in Vitamin A. (2) Milk is exceedingly low in niacin. (3) The calf oftentimes needs more ascorbic acid than is present in milk.

How does the calf get these vitamins naturally Colostrum milk is approximately 10 times richer in Vitamin A than normal milk. Thus, feeding adequate amounts (12 to 16 pounds of colostrum to a 100-pound calf per day) will furnish this vitamin. However, it is believed by many that colostrum milk may be lower in its Vitamin-A content during certain seasons of the year and therefore cannot be depended upon in all cases for the extra amount required.

The B-vitamins are normally made in the rumen. When the rumen is fully functioning, the bacteria there make sufficient niacin. However, the young calf (up to three weeks of age) does not have a fully functioning rumen and may be handicapped for the need of this vitamin.

Likewise, cattle usually make their own ascorbic acid. The young calf begins this manufacturing process around the 15th to 20th day of age.

Vitamin D is obtained from sun-cured hay or directly from the effect of sunlight on the calf itself.

What are the symptoms when these vitamins are lacking?

The symptoms of Vitamin-A deficiency in calves usually begin with watery eyes, cold in the head with a discharge from the nose, sometimes a cough, and scours—mild to begin with but severe if they continue. The calves suffer for three to 10 days with this disease and then die from an acute case of pneumonia. Mild deficiencies in Vitamin A are characterized by general unthriftiness, a dead, roughened hair coat, and lack of growth.

Lack of Vitamin A weakens the entire system and always causes injury to the digestive organs, with scours as the result. For this reason Vitamin A is needed.

Nicotinic acid is needed to keep the digestive organs working properly. Lack of this causes congestion of blood in the vessels and flabbiness of the muscles along the digestive tract. The absorption of Vitamin A may be interfered with. Thus, the lack of nicotinic acid causes a digestive disturbance which will result in scours.

The lack of enough calcium, phosphorus, or both, or Vitamin D, causes rickets in calves. Rickets in the calf is first observed as stiffness and in later stages as "bowed legs." Vitamin D aids calcium and phosphorus in building bones and therefore is needed to form a good, sound skeleton.

Vitamin D is usually the limiting factor in rickets, especially in the fall-dropped calves. The prevalence of rickets is most marked during the winter period when there is very little sunshine. Sun-

light (except winter) irradiates animals when they are outside and they obtain their Vitamin D in this way.

Calf scours are a regular occurrence in some herds; we often hear of farmers who almost give up in despair in their attempts to raise calves.

Scours have a way of being especially troublesome with calves which have been dropped by cows fed for protracted periods on hay made during a season unfavorable to production of high-quality roughage. This haymaking handicap prevailed last summer in some sections of the Midwest, and the after effects may show up this winter in ways already described.

Herdsmen on many of the larger dairy farms already have stocked up with calf pills, and many smaller operators are now finding this method effective. If you've been having trouble raising calves, pill-feeding deserves a place in the calf-feeding schedule.

Humus—The Working Partner of Plant Food

Condensed from Commercial Fertilizer

Vincent Sauchelli

Agronomist, The Davison Chemical Corporation

TIME and again in booklet, bulletin, article and speech, representatives of the commercial fertilizer industry have emphasized that humus is an essential part of the soil, so much so that without it a soil is not fit for agricultural use. Extension agronomists and research agronomists have been engaged for years in proving by field plots and pot tests in all parts of the world the essential need of humus in crop soils.

We commonly use the word "humus" interchangeably with the phrase "organic matter." Perhaps because it is shorter. Most often what we really mean to say is "organic matter." The organic matter of the soil comprises freshly received, actively decaying plant and animal residues, and the older, more slowly decaying portion which, already having passed through the active stages of decay, is nearing the stage of complete decomposition. Humus is the term applied to this latter stage.

Reprinted by permission from Commercial Fertilizer, Nov., 1944, Atlanta, Ga.

*Table 1

26-YEAR AVERAGE ACRE YIELDS WITH EIGHT TONS OF MANURE ON CORN

(Ohio Experiment Station)

Treatment	Corn Bushels	Bushels Wheat	Clover Cwt.
Phosphated manure	67.7	28.6	49.0
Stall manure	61.9	23.8	41.5
Open-yard manure	55.9	22.8	36.6
No manure	36.8	14.2	29.4

*Soils and Fertilizers—3d Ed. F. E. Bear.

It is extremely difficult to draw a line dividing the two classes of organic matter. Humus has been defined as "soil organic matter that has undergone decay to the extent that it has lost its identity." That is a practical definition. Technically, humus is characterized by a certain ratio of the element carbon to nitrogen. In humid regions this ratio averages about 10 to 1, and in semi-arid climates it averages higher but seldom exceeds 14 to 1. In the following discussion we shall use the phrase "organic matter" rather than the term "humus" unless it is necessary to be specific and technical.

Nature builds soils of many kinds—some poor, such as sands and gravels, some rich, such as clays and loams. As soon as they are laid down they are subjected to the effects of its agencies—sun, wind, air, water, and plants, animals and soil organisms. Both physical and vital agents affect soils favorably and destructively. Soil bacteria invade them and as they assimilate the nitrogen of the air, they grow and multiply and die, leaving in the soil a rich legacy of nutrients for the growth of plants. Plants become established, feed on the bacterial legacies of plantfood, grow, multiply and die, returning thereby

Table 2

EFFECT OF FERTILIZERS ON ACCUMULATION OF ORGANIC MATTER

(Dr. F. E. Bear)

Treatment	Fertilizers Applied in 15 Years Tons Per Acre	Total Produce in 15 Years Lbs. Per Acre	Organic Matter in Soil at End Lbs. Per Acre
No fertilizer	None	40,960	42,800
Complete fertilizer	5	117,910	60,800
Manure	190	139,670	73,600
Complete fertilizer and lime	7.5*	120,605	49,000
Manure and lime	212.5	152,400	65,000

*2.5 tons burnt lime.

to the soil, increasing supplies of organic matter which serves to feed soil organisms. And so the cycle goes on and on. Thus the original dead mineral earth is transmuted into living soil suitable for agriculture.

Soil is indeed a living thing. Farm soils contain billions upon billions of bacteria and other living organisms. We must keep this fact in mind as we inquire into the causes leading to the fertility or sterility of a soil. The fertile soil in which a crop is struggling to establish itself is the battle ground of these myriad armies of bacteria and the crop rootlets: both contending for the available mineral food, the water, and the nitrogen. The soil organisms take their full share of the available food which the crop also must have. Unless there is enough for both, the crop comes out second best and usually at a time when it needs that food most urgently.

But these organisms are not really enemies of the crop. As previously mentioned, they assimilate the raw mineral elements which, as such, are not always suitable for plant nourishment, make food substances out of them, and these they share with the plant. Upon death the bacteria further benefit the plant by bequeathing to it the substance of their bodies and food which they hoarded during their brief life-span.

Organic matter, of course, serves in other ways to make soils productive besides furnishing plantfood. It increases the water-holding capacity; soils high in organic matter resist drouths more effectively. It improves the tilth of a soil: makes it possible to work heavy clay soils into satisfactory seed beds. It reduces soil erosion.

Barnyard manure is one of the best sources of organic matter. Its application to soils is one of the oldest methods known for improving fertility. Manure is rich in organic compounds containing carbon and nitrogen. Some investors in fact believe the carbon is the more valuable part of manure. Soil bacteria utilize the carbon together with nitrogen and phosphates in building their own body substance which upon their death and decomposition is released as plant nutrients.

Organic matter as such is not a direct plantfood: bacteria must first decompose it into simple end products such as water, carbon dioxide, nitrogen, ammonia and mineral salts. These simple end products constitute the food of plants.

Good as manure admittedly is, it cannot be considered a balanced, complete plantfood. It is relatively rich in nitrogen but

poor in minerals, especially phosphates. The farmer who supplies 10 to 15 tons of it to the acre may think he is giving the crop all the food it needs. Perhaps he may be giving enough nitrogen. That depends upon the crop. He is not supplying enough phosphates and potash. The universal experience of investigators and most farmers is that the use of farmyard manure alone is wasteful and unjustified. For maximum returns the manure must be supplemented with phosphates, and very often, with potash.

A reference to field tests illustrates this. Typical of what happens from the use of manure alone and reinforced with fertilizer are the results in Table 1, as reported by Dr. Firman E. Bear. In this test eight tons of manure were applied to the clover sod in a three-year rotation of corn, wheat and clover. Limestone had been used as needed to get a good stand of clover.

At the Petersburg (Va.) Experiment Station it was found that a good crop of crimson clover turned under increased the corn crop by 17.6 bushels as compared with land where no clover was grown. But when the crimson clover had been fertilized and then turned under, the corn crop was increased by 39.6 bushels or a gain of 22 bushels over the unfertilized crimson clover. Here, again, organic matter alone did not supply a balanced food ration. Best results occurred when the organic matter was supplemented with chemical fertilizers.

These tests are merely typical of thousands of others whose results support what is here stressed about the partnership between fertilizers and organic matter.

Cultivation of a soil creates conditions favorable for decay and depletion of the soil organic matter. Unless replenished, the original store of organic matter rapidly declines to the point where crop returns are no longer profitable. Because of the scarcity of farm manure, it is necessary to turn under crop residues and green manure crops to keep up the supply. It is in this connection that chemical fertilizers make one of their best contributions. In the case of the continuous growth of a clean-culture crop, such as corn or cotton, soil organic matter is destroyed very rapidly. If a variety of crops is grown, as in a rotation, in which the proportion of clean-culture crops is not too large, it is possible to maintain the organic matter to a satisfactory level by supplementing with purely chemical fertilizers. This is done by promoting the growth of sod crops which are turned under, and also by stimulating a larger growth of

the clean-culture crops whose residues above and below ground are incorporated in the soil.

The following data, given by Dr. F. E. Bear, illustrate this point. They show the relation between crop yields and organic matter content of soils at the end of a fifteen-year experiment involving manure, fertilizers, and lime on DeKalb silt loam soil. All the crops were harvested and removed so that the normal residues alone contributed to the organic matter supply.

We see that five tons of complete fertilizer during the 15-year period produced an increase of over 40 per cent in the organic matter content per plowed acre of soil. Manure made a larger contribution but, considering the huge amounts applied, one would expect more. Dr. Bear, commenting on these results, observes that "soil organic matter is largely a by-product of good farming; the larger the crop, the more refuse for plowing under. Assuming that the rotation includes sod crops, the supply of organic matter in the soil can be maintained at a high level by the use of inorganic fertilizers alone."

There is not and should not be any conflict between fertilizer producers and their salesmen and those who favor and promote organic matter renewal. Humus is not indestructible. When it has become depleted commercial fertilizer becomes less effective. That is common farm experience. It is under such circumstances that some farmers may be inclined to blame the fertilizer salesman and his product.

It is my conviction that soil fertility can never be stabilized and kept up unless soil humus is maintained at a level normal for the region and soil type. Humus renewal helps keep soils young and fertile, the humus tending to hold fertility and helping to keep the mineral elements in the fertilizer and lime in circulation. Drouth years may be even more calamitous if soil humus is badly depleted, because insufficient humus aggravates the handicaps of an insufficient water supply. Commercial fertilizers used in liberal quantities help to grow large crops of green manure in the rotation which when turned under renew the humus supply. Fertilizers, lime, and organic matter complement one another. Each has a specific job to do, but to succeed profitably they must work together—the perfect working partnership for a big harvest.

New Equipment Adapted to Contour Farming

Condensed from Northwest Equipment Journal

Dr. George A. Pond

Professor of Agricultural Economics, University of Minnesota

A PERMANENT and prosperous agriculture is impossible unless we maintain our basic resource—the soil. Good cropping systems contribute to this, but in many cases they must be supplemented with contour cultivation, terraces, and strip cropping to minimize soil losses through water erosion. Practices of this type may involve some change in machine equipment as well as in labor and power.

A study of farms in a soil erosion control program in Winona county, Minnesota, for the years 1935 to 1940, indicated that contour farming involves very definite changes in the number, size and shape of fields. In this case, the number of fields per farm was practically doubled. Not only were the contour fields smaller, but they were more irregular in shape and much longer in proportion to their width than the original fields. The borders of the field were less regular in outline, and in many cases varied in width to such an extent that "point rows" were unavoidable.

These farmers were questioned as to whether they found it necessary or desirable to change the size or type of field machinery or power equipment as compared with what they had used with their larger and more regular rectangular fields before adopting contour cultivation. One of the adjustments frequently mentioned was a change from the old type of tractor to the newer general purpose type with a smaller turning radius. They had difficulty in following the irregular contour and in negotiating sharp turns with the old tractors.

The skid-type of springtooth harrow is not well adapted under erosion control operation because of the time lost in crossing sodded draws. Disks were also objectionable for the same reason. Field cultivators that could be raised easily when crossing these draws were substituted for both springtooth and disk harrows. Wide spike-tooth harrows were also found to be unsatisfactory for narrow and irregular strips because it was impossible to utilize their full capacity. Two-way

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plows that make it unnecessary to turn a furrow up hill were substituted for the standard one-way plow in a few cases.

In general, an implement that can be mounted on the tractor proved more satisfactory for contour tollage than one that was drawn behind the tractor. There was less tendency for side-slip with the mounted implements.

An even more important advantage was that for such equipment as a corn picker or combine, a field could be opened up without destroying any crop around the border. This is an exceedingly important point in view of the much larger length of border per acre on the small, irregular, or long, narrow fields.

It may be concluded from the experience of these men, that contour farming can be practiced successfully with the types of farm implements and power equipment now available. There is also some indication that tractor operation had a greater advantage on these smaller irregular fields because of the time saved in turning than on larger fields in which turning occupies relatively less of the operating time. The general purpose tractor with a short turning radius made much faster turns than would be possible with horse operation.

The availability of suitable farm machinery and power is not a limitation to the adoption of contour farming for erosion control.

BOOK NOTES

SUCCESSFUL POULTRY MANAGEMENT — By Morley A. Jull, Professor and Head of Poultry Dept., University of Maryland.

This book presents to poultry producers up-to-date information on husbandry practices and marketing methods affecting returns from the poultry enterprise. Special emphasis has been placed on factors affecting the quality of eggs and chicken meat, and on carefully chosen illustrations dealing with the more important problems that affect returns secured on the market.

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A Living from Bees — By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. (1943). $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons (1939). $3.50.

An Agricultural Testament—By Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore. Oxford University Press. $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State Coll., Univ. of Minn., Mont. State Univ. College Book Company. $3.75.

Dairy Cattle and Milk Production — By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Dairy Science — By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D.V.M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition (1943). $3.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing — By V. B. Hart, M. C. Bond, L. C. Cunningham, all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Farm Records — By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Growing Tree and Small Fruits—By H. B. Knapp, Director, State Institute of Applied Agriculture, Farmingdale, Long Island, N. Y., and E. C. Auchter, Chief, Bureau of Plant Industry, U. S. D. A. John Wiley & Sons. $2.75.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

How to Raise Rabbits for Food and Fur — By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. (1943). $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Modern Agricultural Mathematics — By Maurice Nadler, B.S., A.M. Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. (1942). $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., Agricultural Writer, formerly with U. S. Dept. of Agriculture. Orange Judd Publishing Co., Inc. (1944). $4.50.

Natural Principles of Land Use—By Edward H. Graham,, Chief of the Biology Division of the Soil Conservation Service. Oxford University Press. 275 pages. $3.50.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. of Rural Education, Atlanta University, Atlanta, Georgia. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping — By H. Clyde Knandel, Prof. and Head, Dept. of Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Roots in the Earth—The Small Farmer Looks Ahead — By P. Alston Waring and Walter Magnes Teller. Harper & Bros. $2.50.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

The American Land—Its History and Its Uses — By William R. Van Dersal, biologist in the United States Department of Agriculture. Oxford University Press. $3.75.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

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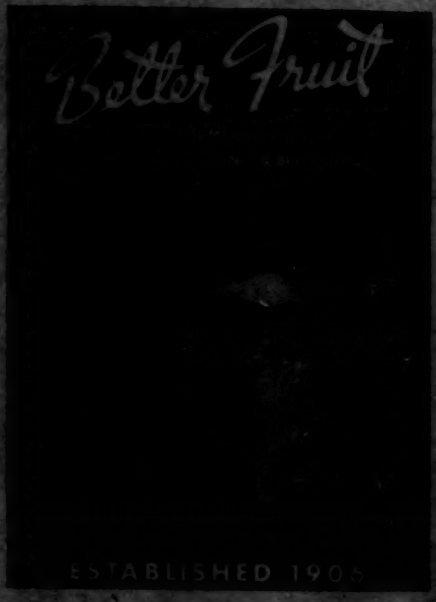

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